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(54) **AN OPERATION CENTER FOR A TELEVISION PROGRAM PACKAGING AND DELIVERY SYSTEM**

OPERATIONSZENTRALE FÜR EIN FERNSEHPROGRAMMPAKETIERUNGS- UND VERSORGUNGSSYSTEM

CENTRE D'EXPLOITATION D'UN SYSTEME DE DIFFUSION ET DE GROUPAGE DE PROGRAMMES DE TELEVISION

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- **JOURNAL OF LIGHTWAVE TECHNOLOGY** vol. 10, no. 11 , November 1992 , NEW YORK, US pages 1760 - 1765 XP000355287 R.OLSHANSKY 'SUBSCRIBER DISTRIBUTION NETWORKS USING COMPRESSED DIGITAL VIDEO'
- **REVUE HF TIJDSCHRIFT** vol. 15, no. 3/4 , 1991 , BRUSSEL, BE pages 135 - 148 XP000307858 M.DINARO 'MARKETS AND PRODUCTS OVERVIEW'

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Description**RELATED APPLICATIONS**

[0001] This application is a continuation-in-part of application Serial Number 07/991,074 filed December 9, 1992, entitled TELEVISION PROGRAM PACKAGING AND DELIVERY SYSTEM WITH MENU DRIVEN SUBSCRIBER ACCESS. The following publications are also based on the above-referenced patent application: EP-A-0 673 578, EP-A-0 673 579, EP-A-0 673 581 to EP-A-0 673 583, EP-A-0 732 027, EP-A-0 732 030, EP-A-0 732 031, and US-A-5 307 627.

TECHNICAL FIELD

[0002] The invention relates to television entertainment systems that provide television programming to consumer homes. More particularly, the invention relates to an Operations Center that organizes and packages cable television programming for delivery to consumer homes.

BACKGROUND OF THE INVENTION

[0003] Advances in television entertainment have been primarily driven by breakthroughs in technology. In 1939, advances on Vladimir Zworykin's picture tube provided the stimulus for NBC to begin its first regular broadcasts. In 1975, advances in satellite technology provided consumers with increased programming to homes.

[0004] Many of these technology breakthroughs have produced inconvenient systems for consumers. One example is the ubiquitous three remote control home, having a separate and unique remote control for the TV, cable box and VCR. More recently, technology has provided cable users with 100 channels of programming. This increased program capacity is beyond the ability of many consumers to use effectively. No method of managing the program choices has been provided to consumers.

[0005] Consumers are demanding that future advances in television entertainment, particularly programs and program choices, be presented to the consumer in a user friendly manner. Consumer preferences, instead of technological breakthroughs, will drive the television entertainment market for at least the next 20 years. As computer vendors have experienced a switch from marketing new technology in computer hardware to marketing better useability, interfaces and service, the television entertainment industry will also experience a switch from new technology driving the market to consumer useability driving the market.

[0006] In order for new television entertainment products to be successful, the products must satisfy consumer demands. TV consumers wish to go from limited viewing choices to a variety of choices, from no control of programming to complete control. Consumers do not wish to pay for one hundred channels when due to lack of programming information, they seldom, if ever, watch programming on many of these channels.

[0007] The concepts of interactive television, high definition television and 300-500 channel cable systems in consumer homes will not sell if they are not packaged, delivered and presented in a useable fashion to consumers. The problem is that TV programming is not being managed, packaged, delivered, and presented to consumers in a user friendly manner.

[0008] Consumers are already being bombarded with programming options, numerous "free" cable channels, subscription cable channels and pay-per-view choices. Any further increase in TV entertainment choices will likely bewilder viewers with a mind-numbing array of choices.

[0009] The TV industry has traditionally marketed and sold its programs to consumers in bulk, such as continuous feed broadcast and long-term subscriptions to movie channels. The TV industry is unable to sell its programming in large quantities on a per unit basis, such as the ordering of one program.

[0010] In today's television world networks manage the program lineup for individual channels. Each network analyzes ratings for television shows and determines the appropriate schedule or program lineup to gain market share and revenue from advertising. Since each channel is in competition with every other channel, there is no coordinated effort to organize television programming in a manner that primarily suits the viewers.

[0011] Additionally, viewership fragmentation, which has already begun to decrease a channel's or program's market share, will increase. Programming not presented in a user friendly manner will suffer with a decrease in viewership and revenue.

[0012] And finally, with the imminent introduction of digital television technology, current television delivery systems do not have the capabilities or features necessary to operate in the digital environment.

[0013] WO-A-89 09528 deals with an impulse pay-per-view system which uses access codes.

[0014] WO-A-86 01962 discloses an information display system for displaying on each individual subscriber's television set information unique to subscribers.

[0015] EP-A-0 424 648 relates in a certain aspect to creating and transmitting to viewers a program control information

signal which has program line-up information.

SUMMARY OF THE INVENTION

[0016] It is an object of the invention to provide a method and an apparatus for television programming to consumer homes, which organise and package cable television programming for delivery to the consumer homes.

[0017] This object is met by an apparatus according to claim 1 and a method according to claim 18. Preferred embodiments are disclosed in the dependent claims.

[0018] This invention is a center for controlling the operations of a digital television program delivery system. Specifically, the present invention is an Operations Center that allows for the organizing and packaging of television programs for transmission in a television delivery system.

[0019] The Operations Center is the nerve center of the television program delivery system. It receives data on viewership behavior and utilizes the data to assist in packaging programs for future viewing. The Operations Center is a particularly useful invention for television delivery systems which will provide users with the ability to select programs from on-screen menus.

[0020] The Operations Center's primary component is a computer assisted packaging system (CAP), which makes use of the necessary hardware and software to control and transmit programming signals over a television delivery system. This computer assisted packaging system creates the program lineup or packaging of programs and the packaging of menu and control information for later transmission and use in the cable television systems. The CAP can be specially designed to generate graphical menu displays for user selection of programs. The hardware and software for controlling and transmitting programming signals over the television delivery system is particularly useful in large television delivery systems which include satellite transmissions to cable headends.

[0021] The software of the CAP performs the functions of gathering analog (and/or digital) program signals from a variety of sources such as broadcast television, premium channels, and video disk. The software also packages the programs efficiently for the available bandwidth and for subscriber viewing through computer assisted creation of program line-up and allocating of bandwidth. The line-ups are created to effectively group programming for display in menus by categories. The television programs are packaged with the program control information (such as cost for viewing certain program) and menu information.

[0022] The Operations Center of the present invention provides a method for remote management and control of local cable and CATV programs available and on-screen menu displays shown to subscribers. The Operations Center's computer software programs and hardware provide "real-time" control over cable and CATV systems. By transmitting appropriate control information the Operations Center has the ability to change allocation of programs across physical channels, update menu information (from the Operations Center location), reprogram menu formats and menu flow, and change or augment a packaged program signal sent to a particular region of the country. The Operations Center is able to control remotely certain features and software of the set top terminals and if necessary reprogram menu display software stored at the set top terminals.

[0023] In order to properly manage program lineups, the Operations Center acquires viewer information on programs watched. Such viewer information includes information about the buy rates of specific shows, viewer preferences for programming, and the like, gathered by recording viewer transactions. A compilation of viewer information data is needed in order to make decisions on future individualized program lineup and program packaging. In addition, allocation of menu space and construction of menus is aided by the use of viewer information data. This information is received from the set top terminals using a feedback loop, usually through the cable headends.

[0024] The present invention is not only able to operate in the digital environment but introduces many new features to television program delivery.

[0025] The invention provides a system for efficiently organising television programs to be offered to viewers,

an Operations Center for a television program delivery system which can in particular gather television programming in a variety of formats, package the programs, and deliver the packaged programs.

[0026] The invention further provides an Operations Center for a program delivery system which presents programming viewing options to the consumer through a user friendly interface which allows the consumer to easily select from among the many program choices,

that is capable of handling video/audio programming in different formats and of offering interactive television, high definition television (HDTV) and/or other advanced television features.

[0027] The invention also provides an Operations Center that can control software and program features at the cable headend, that can control and, if necessary, reprogram set top terminals, that is capable of a digital program delivery

system, that designs program menus and

that uses data on programs viewed to create or aid in the selection of program line-ups.

5 [0028] The invention further provides a computer assisted program packaging system for a television program delivery system.

[0029] These and other objects and advantages of the invention will become obvious to those skilled in the art upon review of the following description, the attached drawings and appended claims.

10 DESCRIPTION OF THE DRAWINGS

[0030] Figure 1 is a diagram of the primary components of the television delivery system.

[0031] Figure 2 is an overview of the television delivery system operations.

[0032] Figure 3 is a schematic of the operation of the primary components of the system.

15 [0033] Figure 4 is a schematic of the primary components of the Computer Assisted Packaging System (CAP).

[0034] Figure 5 is a more detailed schematic of the hardware of the Operations Center and CAP.

[0035] Figure 6a is a chart of the program control information carried by the program control information signal.

[0036] Figure 6b shows a bit-wise data format for program control information.

20 [0037] Figure 7 is a block diagram showing a Delivery Control Processor Unit and a Computer Assisted Packaging Apparatus.

[0038] Figure 8 is a schematic of the subroutines for the CAP software.

[0039] Figure 9 is a software flowchart representing CAP operations.

[0040] Figure 10 is a diagram of the database structure for the databases supporting the operations of the CAP.

[0041] Figure 11 is a block diagram of the Operations Center and Master Control Site.

25 [0042] Figure 12 is a block diagram of the computer assisted packaging shown in figure 11.

[0043] Figure 13 is a flow chart of the processing occurring at the Operations Center.

[0044] Figure 14 is a diagram of the bandwidth allocation for a 750 Mhz system.

[0045] Figure 15 is a diagram/chart of the compressed channel allocation for the system.

30 [0046] Figure 16 is a diagram showing how three cable television systems each with a different bandwidth may use the program delivery system and operations center of the present invention simultaneously.

[0047] Figure 17 is a diagram showing three different cable headend systems, each system receiving the entire satellite signal and stripping those parts of the signal which cannot be handled by the local cable system.

[0048] Figure 18 is a diagram showing dynamic change in bandwidth allocation from a typical week day prime time program signal to a Saturday afternoon program signal.

35 [0049] Figure 19 is a drawing of a broadcast television menu screen to be displayed on a set top terminal.

[0050] Figure 20 is a drawing of a hit movie menu screen to be displayed on a set top terminal.

[0051] Figure 21 is a drawing of a hit movie description menu screen to be displayed on a set top terminal.

40 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A. Television Program Delivery System Description

1. Introduction

45 [0052] Figure 1 shows the present invention as part of an expanded cable television program delivery system 200 that dramatically increases programming capacity using compressed transmission of television program signals. Developments in digital bandwidth compression technology now allow much greater throughput of television program signals over existing or slightly modified transmission media. The program delivery system 200 shown provides subscribers with a user friendly interface to operate and exploit a six-fold or more increase in current program delivery capability.

50 [0053] Subscribers are able to access an expanded television program package and view selected programs through a menu-driven access scheme that allows each subscriber to select individual programs by sequencing a series of menus. The menus are sequenced by the subscriber using simple alpha-numeric and iconic character access or moving a cursor or highlight bar on the TV screen to access desired programs by simply pressing a single button, rather than recalling from memory and pressing the actual two or more digit numeric number assigned to a selection. Thus, with
55 the press of a single button, the subscriber can advance from one menu to the next. In this fashion, the subscriber can sequence the menus and select a program from any given menu. The programs are grouped by category so that similar program offerings are found on the same menu.

2. Major System Components

[0054] In its most basic form, the system uses a program delivery system 200 in conjunction with a conventional concatenated cable television system 210. The program delivery system 200 generally includes (i) at least one operations center 202, where program packaging and control information are created and then assembled in the form of digital data, (ii) a digital compression system, where the digital data is compressed, combined/multiplexed, encoded, and mapped into digital signals for satellite transmission to the cable headend 208, and (iii) a set of in-home decompressors. The program delivery system 200 transports the digital signals to the cable head end 208 where the signals are transmitted through a concatenated cable television system 210. Within the cable headend 208, the received signals may be decoded, demultiplexed, managed by a local central distribution and switching mechanism, combined and then transmitted to the set top terminal 220 located in each subscriber's home over the cable system 210. Although concatenated cable systems 210 are the most prevalent transmission media to the home, telephone lines, cellular networks, fiberoptics, Personal Communication Networks and similar technology for transmitting to the home can be used interchangeably with this program delivery system 200.

[0055] The delivery system 200 has a reception region 207 with an in-home decompression capability. This capability is performed by a decompressor housed within a set top terminal 220 in each subscriber's home. The decompressor remains transparent from the subscriber's point of view and allows any of the compressed signals to be demultiplexed and individually extracted from the composite data stream and then individually decompressed upon selection by the subscriber. The decompressed video signals are converted into analog signals for television display. Such analog signals include NTSC formatted signals for use by a standard television. Control signals are likewise extracted and decompressed and then either executed immediately or placed in local storage such as a RAM. Multiple sets of decompression hardware may be used to decompress video and control signals. The set top terminal 220 may then overlay or combine different signals to form the desired display on the subscriber's television. Graphics on video or picture-on-picture are examples of such a display.

[0056] Although a single digital compression standard (e.g., MPEG) may be used for both the program delivery system 200 and the concatenated cable system 210, the compression technique used may differ between the two systems. When the compression standards differ between the two media, the signals received by the cable headend 208 must be decompressed before transmission from the head end 208 to the set top terminals 220. Subsequently, the cable head end 208 must recompress and transmit the signals to the set top terminal 220, which would then decompress the signals using a specific decompression algorithm.

[0057] The video signals and program control signals received by the set top terminal 220 correspond to specific television programs and menu selections that each subscriber may access through a subscriber interface. The subscriber interface is a device with buttons located on the set top terminal 220 or on a portable remote control 900. In the preferred system embodiment, the subscriber interface is a combined alpha-character, numeric and iconic remote control device 900, which provides direct or menu-driven program access. The preferred subscriber interface also contains cursor movement and go buttons as well as alpha, numeric and iconic buttons. This subscriber interface and menu arrangement enables the subscriber to sequence through menus by choosing from among several menu options that are displayed on the television screen. In addition, a user may bypass several menu screens and immediately choose a program by selecting the appropriate alpha-character, numeric or iconic combinations on the subscriber interface. In the preferred embodiment, the set top terminal 220 generates the menus that are displayed on the television by creating arrays of particular menu templates, and the set top terminal 220 displays a specific menu or submenu option for each available video signal.

3. Operations Center and Digital Compression System

[0058] The operations center 202 performs two primary services, packaging television programs and generating the program control information signal. At the operations center 202, television programs are received from external program sources in both analog and digital form. Figure 2 shows an embodiment of the operations center receiving signals from various external sources 212. Examples of the external program sources are sporting events, children's programs, specialty channels, news or any other program source that can provide audio or visual signals. Once the programs are received from the external program sources, the operations center 202 digitizes (and preferably compresses) any program signals received in analog form. The operations center 202 may also maintain an internal storage of programs. The internally stored programs may be in analog or digital form and stored on permanent or volatile memory sources, including magnetic tape or RAM. Subsequent to receiving programming, the operations center 202 packages the programs into the groups and categories which provide the optimal marketing of the programs to subscribers. For example, the operations center 202 may package the same programs into different categories and menus for weekday, prime-time viewing and Saturday afternoon viewing. Also, the operations center 202 packages the television programs in a manner that enables both the various menus to easily represent the programs and the subscribers to easily access

the programs through the menus.

[0059] The packaging of the digital signals is typically performed at the operations center 202 by computer assisted packaging equipment (CAP). The CAP system normally includes at least one computer monitor, keyboard, mouse, and standard video editing equipment. A programmer packages the signals by entering certain information into the CAP. This information includes the date, time slot, and program category of the various programs. The programmer and the CAP utilize demographic data and ratings in performing the packaging tasks. After the programmer selects the various programs from a pool of available programs and inputs the requisite information, the programmer, with assistance from the CAP, can select the price and allocate transponder space for the various programs. After the process is complete, the CAP displays draft menus or program schedules that correspond to the entries of the programmer. The CAP may also graphically display allocation of transponder space. The programmer may edit the menus and transponder allocation several times until satisfied with the programming schedule. During the editing, the programmer may direct the exact location of any program name on a menu with simple commands to the CAP.

[0060] The packaging process also accounts for any groupings by satellite transponder which are necessary. The operations center 202 may send different groups of programs to different cable headends 208 and/or set top terminals 220. One way the operations center 202 may accomplish this task is to send different program packages to each transponder. Each transponder, or set of transponders, then relays a specific program package to specific cable headends 208 and/or set top terminals 220. The allocation of transponder space is an important task performed by the operations center 202.

[0061] The operations center 202 may also "insert" directions for filling local available program time in the packaged signal to enable local cable and television companies to fill the program time with local advertising and/or local programming. Consequently, the local cable headends 208 are not constrained to show only programs transmitted from the operations center 202. New set top converters will incorporate both digital and analog channels. Therefore, the cable headend 208 may combine analog signals with the digital signals prior to transmitting the program signals to the set top terminals 220.

[0062] After the CAP packages the programs, it creates a program control information signal to be delivered with the program package to the cable headend 208 and/or set top terminal 220. The program control information signal contains a description of the contents of the program package, commands to be sent to the cable headend 208 and/or set top terminal 220, and other information relevant to the signal transmission.

[0063] In addition to packaging the signal, the operations center 202 employs digital compression techniques to increase existing satellite transponder capacity by at least a 4:1 ratio, resulting in a four-fold increase in program delivery capability. A number of digital compression algorithms currently exist which can achieve the resultant increase in capacity and improved signal quality desired for the system. The algorithms generally use one or more of three basic digital compression techniques: (1) within-frame (intraframe) compression, (2) frame-to-frame (interframe) compression, and (3) within carrier compression. Specifically, in the preferred embodiment, the MPEG 2 compression method is used. After digital compression, the signals are combined (multiplexed) and encoded. The combined signal is subsequently transmitted to various uplink sites 204.

[0064] There may be a single uplink site 204 or multiple uplink sites (represented by 204', shown in phantom in Figure 1) for each operation center 202. The uplink sites 204 may either be located in the same geographical place or may be located remotely from the operations center 202. Once the composite signal is transmitted to the uplink sites 204, the signal may be multiplexed with other signals, modulated, upconverted and amplified for transmission over satellite. Multiple cable headends 208 may receive such transmissions.

[0065] In addition to multiple uplinks, the delivery system 200 may also contain multiple operations centers. The preferred method for using multiple operations centers is to designate one of the operations centers as a master operations center and to designate the remaining operations centers as slave operations centers. In this configuration, the master operations center coordinates various functions among the slave operations centers such as synchronization of simultaneous transmissions and distributes the operations workload efficiently.

4. Cable Headend

[0066] After the operations center 202 has compressed and encoded the program signals and transmitted the signals to the satellite, the cable head end 208 receives and further processes the signals before they are relayed to each set top terminal 220. Each cable headend site is generally equipped with multiple satellite receiver dishes. Each dish is capable of handling multiple transponder signals from a single satellite and sometimes from multiple satellites.

[0067] With reference to Figure 3, as an intermediary between the set top terminals 220 and the operations center 202 and master control uplink site 211 (or other remote site), the cable headend 208 performs two primary functions. First, the cable headend 208 acts as a distribution center, or signal processor, by relaying the program signal to the set top terminal 220 in each subscriber's home. In addition, the cable headend 208 acts as a network controller 214 by receiving information from each set top terminal 220 and passing such information on to an information gathering

site such as the operations center 202.

[0068] Figure 3 shows an embodiment where the cable head end 208 and the subscriber's home are linked by certain communications media 216. In this particular embodiment, analog signals, digitally compressed signals, other digital signals and up-stream/interactivity signals are sent and received over the media 216. The cable headend 208 provides such signaling capabilities in its dual roles as a signal processor 209 and network controller 214.

[0069] As a signal processor 209, the cable headend 208 prepares the program signals that are received by the cable headend 208 for transmission to each set top terminal 220. In the preferred system, the signal processor 209 re-routes or demultiplexes and recombines the signals and digital information received from the operations center 202 and allocates different portions of the signal to different frequency ranges. Cable headends 208 which offer different subscribers different program offerings may allocate the program signals from the operations center 202 in various manners to accommodate different viewers. The signal processor 209 may also incorporate local programming and/or local advertisements into the program signal and forward the revised signal to the set top terminals 220. To accommodate this local programming availability, the signal processor 209 must combine the local signal in digital or analog form with the operations center program signals. If the local cable system uses a compression standard that is different than the one used by the operations center 202, the signal processor 209 must also decompress and recompress incoming signals so they may be properly formatted for transmission to the set top terminals 220. This process becomes less important as standards develop (i.e., MPEG 2). In addition, the signal processor 209 performs any necessary signal decryption and/or encryption.

[0070] As a network controller 214, the cable headend 208 performs the system control functions for the system. The primary function of the network controller 214 is to manage the configuration of the set top terminals 220 and process signals received from the set top terminals 220. In the preferred embodiment, the network controller 214 monitors, among other things, automatic poll-back responses from the set top terminals 220 remotely located at each subscribers' home. The polling and automatic report-back cycle occurs frequently enough to allow the network controller 214 to maintain accurate account and billing information as well as monitor authorized channel access. In the simplest embodiment, information to be sent to the network controller 214 will be stored in RAM within each subscriber's set top terminal 220 and will be retrieved only upon polling by the network controller 214. Retrieval may, for example, occur on a daily, weekly or monthly basis. The network controller 214 allows the system to maintain complete information on all programs watched using a particular set top terminal 220.

[0071] The network controller 214 is also able to respond to the immediate needs of a set top terminal 220 by modifying a program control information signal received from the operations center 202. Therefore, the network controller 214 enables the delivery system to adapt to the specific requirements of individual set top terminals 220 when the requirements cannot be provided to the operations center 202 in advance. In other words, the network controller 214 is able to perform "on the fly programming" changes. With this capability, the network controller 214 can handle sophisticated local programming needs such as, for example, interactive television services, split screen video, and selection of different foreign languages for the same video. In addition, the network controller 214 controls and monitors all compressors and decompressors in the system.

[0072] The delivery system 200 and digital compression of the preferred embodiment provides a one-way path from the operations center 202 to the cable headend 208. Status and billing information is sent from the set top terminal 220 to the network controller 214 at the cable headend 208 and not directly to the operations center 202. Thus, program monitoring and selection control will take place only at the cable headend 208 by the local cable company and its decentralized network controllers 214 (i.e., decentralized relative to the operations center 202, which is central to the program delivery system 200). The local cable company will in turn be in communication with the operations center 202 or a regional control center (not shown) which accumulates return data from the set top terminal 220 for statistical or billing purposes. In alternative system embodiments, the operations center 202 and the statistical and billing sites are collocated. Further, telephone lines with modems are used to transfer information from the set top terminal 220 to the statistical and billing sites.

5. Set Top Terminal

[0073] The set top terminal 220 is the portion of the delivery system 200 that resides in the home of a subscriber. The set top terminal 220 is usually located above or below the subscriber's television, but it may be placed anywhere in or near the subscriber's home as long as it is within the range of the subscriber's remote control device 900. In some aspects, the set top terminal 220 may resemble converter boxes already used by many cable systems. For instance, each set top terminal 220 may include a variety of error detection, decryption, and coding techniques such as anti-taping encoding. However, it will become apparent from the discussion below that the set top terminal 220 is able to perform many functions that an ordinary converter box cannot perform.

[0074] The set top terminal 220 has a plurality of input and output ports to enable it to communicate with other local and remote devices. The set top terminal 220 has an input port that receives information from the cable headend 208.

In addition, the unit has at least two output ports which provide communications from the set top terminal 220 to a television and a VCR. Certain menu selections may cause the set top terminal 220 to send control signals directly to the VCR to automatically program or operate the VCR. Also, the set top terminal 220 contains a phone jack which can be used for maintenance, trouble shooting, reprogramming and additional customer features. The set top terminal 220 may also contain stereo/audio output terminals and a satellite dish input port.

[0075] Functionally, the set top terminal 220 is the last component in the delivery system chain. The set top terminal 220 receives compressed program and control signals from the cable headend 208 (or, in some cases, directly from the operations center 202). After the set top terminal 220 receives the individually compressed program and control signals, the signals are demultiplexed, decompressed, converted to analog signals (if necessary) and either placed in local storage (from which the menu template may be created), executed immediately, or sent directly to the television screen.

[0076] After processing certain signals received from the cable headend 208, the set top terminal 220 is able to store menu templates for creating menus that are displayed on a subscriber's television by using an array of menu templates. Before a menu can be constructed, menu templates must be created and sent to the set top terminal 220 for storage. A microprocessor uses the control signals received from the operations center 202 or cable headend 208 to generate the menu templates for storage. Each menu template may be stored in volatile memory in the set top terminal 220. When the set top terminal receives template information it demultiplexes the program control signals received from the cable headend 208 into four primary parts: video, graphics, program logic and text. Each menu template represents a different portion of a whole menu, such as a menu background, television logo, cursor highlight overlay, or other miscellaneous components needed to build a menu. The menu templates may be deleted or altered using control signals received from the operations center 202 or cable headend 208.

[0077] Once the menu templates have been stored in memory, the set top terminal 220 can generate the appropriate menus. In the preferred embodiment, the basic menu format information is stored in memory located within the set top terminal 220 so that the microprocessor may locally access the information from the set top terminal instead of from an incoming signal. The microprocessor next generates the appropriate menus from the menu templates and the other menu information stored in memory. The set top terminal 220 then displays specific menus on the subscriber's television screen that correspond to the inputs the subscriber selects.

[0078] If the subscriber selects a specific program from a menu, the set top terminal 220 determines on which channel the program is being shown, demultiplexes and extracts the single channel transmitted from the cable headend 208. The set top terminal 220 then decompresses the channel and, if necessary, converts the program signal to an analog NTSC signal to enable the subscriber to view the selected program. The set top terminal 220 can be equipped to decompress more than one program signal, but this would unnecessarily add to the cost of the unit since a subscriber will generally only view one program at a time. However, two or three decompressors may be desirable to provide picture-on-picture capability, control signal decompression, enhanced channel switching or like features.

[0079] In addition to menu information, the set top terminal 220 may also store text transmitted from the cable head end 208 or the operations center 202. The text may inform the subscriber about upcoming events, billing and account status, new subscriptions, or other relevant information. The text will be stored in an appropriate memory location depending on the frequency and the duration of the use of the textual message.

[0080] Also, optional upgrades are available to enhance the performance of a subscriber's set top terminal 220. These upgrades may consist of a cartridge or computer card (not shown) that is inserted into an expansion slot in the set top terminal 220 or may consist of a feature offered by the cable head end 208 or operations center 202 to which the user may subscribe. Available upgrades may include on line data base services, interactive multi-media services, access to digital radio channels, and other services.

[0081] In the simplest embodiment, available converter boxes such as those manufactured by General Instruments or Scientific Atlanta, may be modified and upgraded to perform the functions of a set top terminal 220. The preferred upgrade is a circuit card with a microprocessor which is electronically connected to or inserted into the converter box.

6. Remote Control Device

[0082] The primary conduit for communication between the subscriber and the set top terminal 220 is through the subscriber interface, preferably a remote control device 900. Through this interface, the subscriber may select desired programming through the system's menu-driven scheme or by directly accessing a specific channel by entering the actual channel number. Using the interface, the subscriber can navigate through a series of informative program selection menus. By using menu-driven, iconic or alpha-character access, the subscriber can access desired programs by simply pressing a single button rather than recalling from memory and pressing the actual channel number to make a selection. The subscriber can access regular broadcast and basic cable television stations by using either the numeric keys on the remote control 900 (pressing the corresponding channel number), or one of the menu icon selection options.

[0083] In addition to enabling the subscriber to easily interact with the cable system 200, the physical characteristics

of the subscriber interface 900 should also add to the user friendliness of the system. The remote control 900 should easily fit in the palm of the user's hand. The buttons of the preferred remote control 900 contain pictorial symbols that are easily identifiable by the subscriber. Also, buttons that perform similar functions may be color coordinated and consist of distinguishing textures to increase the user friendliness of the system.

7. Menu-Driven Program Selection

[0084] The menu-driven scheme provides the subscriber with one-step access to all major menus, ranging from hit movies to sport specials to specialty programs. From any of the major menus, the subscriber can in turn access sub-menus and minor menus by cursor or alpha-character access.

[0085] There are two different types of menus utilized by the preferred embodiment, the Program Selection menus and the During Program menus. The first series of menus, Program Selection menus, consists of an Introductory, a Home, Major menus, and Submenus. The second series of menus, During Program menus, consists of two primary types, Hidden menus and the Program Overlay menus.

[0086] Immediately after the subscriber turns on the set top terminal 220, the Introductory menu welcomes the subscriber to the system. The Introductory menu may display important announcements from the local cable franchise, advertisements from the cable provider, or other types of messages. In addition, the Introductory menu can inform the subscriber if the cable headend 208 has sent a personal message to the subscriber's particular set top terminal 220.

[0087] After the Introductory menu has been displayed the subscriber may advance to the next level of menus, namely the Home menu. In the preferred embodiment, after a certain period of time, the cable system will advance the subscriber by default to the Home menu. From the Home menu, the subscriber is able to access all of the programming options. The subscriber may either select a program directly by entering the appropriate channel number from the remote control 900, or the subscriber may sequence through incremental levels of menu options starting from the Home menu. The Home menu lists categories that correspond to the first level of menus called Major menus.

[0088] If the subscriber chooses to sequence through subsequent menus, the subscriber will be forwarded to the Major menu that corresponds to the chosen category from the Home menu. The Major menus further refine a subscriber's search and help guide the subscriber to the selection of his choice.

[0089] From the Major menus, the subscriber may access several submenus. From each submenu, the subscriber may access other submenus until the subscriber finds a desired television program. Similar to the Major menu, each successive level of Submenus further refines the subscriber's search. The system also enables the subscriber to skip certain menus or submenus and directly access a specific menu or television program by entering the appropriate commands on the remote control 900.

[0090] The During program menus (including Hidden Menus and Program Overlay Menus) are displayed by the set top terminal 220 only after the subscriber has selected a television program. In order to avoid disturbing the subscriber, the set top terminal 220 does not display the Hidden Menus until the subscriber selects the appropriate option to display a Hidden Menu. The Hidden Menus contain options that are relevant to the program selected by the viewer. For example, a Hidden Menu may contain options that enable a subscriber to enter an interactive mode or escape from the selected program.

[0091] Program Overlay Menus are similar to Hidden Menus because they occur during a program and are related to the program being viewed. However, the Program Overlay Menus are displayed concurrently with the program selected by the subscriber. Most Program Overlay Menus are small enough on the screen to allow the subscriber to continue viewing the selected program comfortably.

B. Operations Center With Computer Assisted Packaging System

[0092] Figure 4 broadly shows the configuration for the computer assisted packaging system (CAP) 260 of the Operations Center 202. The primary components of the CAP 260 consist of multiple packager workstations 262, a central processing unit 264, video/audio editing equipment 266, and one or more databases 268 and 269. Additional remotely located databases, such as local video storage database 267, and buffers 271 and controllers 272 for external program feeds make up the peripherals of the CAP system 260.

[0093] The heart of the CAP 260 is a central processing unit 264 which communicates with all the component parts of the CAP 260. The central processing unit 264 can be a powerful PC, a mini-computer, a mainframe or a combination of computing equipment running in parallel. The central processing unit 264 includes all the necessary interconnections to control peripheral equipment such as the external video controls 272. The central processing unit 264 has sufficient memory 274 to store the program instructions of the subroutines which operate the CAP 260.

[0094] The CAP 260 receives data from one or more databases, such as the Operations Center Database 268 and the Cable Franchise Information Database 269 shown in Figure 4. In addition, separate databases are maintained of viewer information, such as demographics and programs viewed. The CAP 260 can control the reception of external

sources by enabling and disabling the external video controls 272. The external video controls 272 include buffers to delay as necessary external programs received by the Operations Center 202.

[0095] The functions of the video/audio equipment 266 include digitizing analog programs, digitizing and compressing analog programs (in a single step, e.g., MPEG), and compressing digital program signals as requested by the central processing unit 264.

[0096] The CAP 260 receives video and audio from two sources: internally from a local video storage 267 and externally from external sources through external video controls 272. When necessary, video is manipulated, formatted and/or digitized using video/audio equipment 266 which is controlled by CAP 264.

[0097] Referring back to Figure 2, an overview of an operating cable television menu driven program delivery system 200 highlighting various external programming signal sources 212 is depicted. The Operations Center 202 is shown receiving external programming signals which correspond to particular programming categories that are available for a subscriber's viewing. These external signals may be in analog or digital form and may be received via landline, microwave transmission, or satellite. Some of these external signals may be transmitted from the program source 212 to the Operations Center 202 in compressed digital format or other nonstandard digital formats. These external signals are received and packaged with programming that is stored at the Operations Center 202.

[0098] Examples of external program sources 212 shown in Figure 2 are: Sporting events, children's programs, documentaries, high definition TV sources, specialty channels, interactive services, weather, news, and other nonfiction or entertainment. Any source that can provide either audio or video or both may be utilized to provide programming to the Operations Center 202.

[0099] In order to achieve the required throughput of video and audio information for the system, digital compression techniques are employed. A television signal is first digitized. The object of digitization is two-fold: First, in the case of an analog signal, like a television picture, digitization allows the signal to be converted from a waveform into a digital binary format. Secondly, through the use of digital compression techniques, standard digital formats are designed to have the resulting pictures or video stills take up less space on their respective storage mediums. Essentially, as described below, a standard digital format will define the method of compression used.

[0100] There are three basic digital compression techniques: within-frame (intraframe), frame-to-frame (interframe), and within-carrier. Intraframe compression processes each frame in a television picture to contain fewer visual details and, therefore, the picture contains fewer digital bits. Interframe compression transmits only changes between frames, thus omitting elements repeated in successive frames. Within-carrier compression allows the compression ratio to dynamically vary depending upon the amount of changes between frames. If a large number of changes occur between frames, the compression ratio drops from, for example, sixteen-to-one to eight-to-one. If action is intense, the compression ratio may dip to four to one.

[0101] Several standard digital formats representing both digitizing standards and compression standards have been developed. For example, JPEG (joint photographic experts group) is a standard for single picture digitization. Motion picture digitization may be represented by standards such as MPEG or MPEG2 (motion picture engineering group specifications). Other proprietary standards have been developed in addition to these. The preferred embodiment uses the MPEG-2 standard of coding and those of ordinary skill in the art are presumed to be familiar with the MPEG-2 standard. The MPEG-2 Systems Working Draft Proposal from the Systems Committee of the International Organization For Standardization, document ISO/IE JT1/SC29/WG11 "N0531" MPEG93 dated September 10, 1993, is hereby incorporated by reference. Although MPEG and MPEG2 for motion pictures are preferred in the present invention, any reliable digital format with compression may be used with the present invention.

[0102] Various hybrids of the above compression techniques have been developed by several companies including AT&T, Compression Labs, Inc., General Instrument, Scientific-Atlanta, Phillips, and Zenith. As is known by those skilled in the art, any of the compression techniques developed by these companies, and other known techniques, may be used with the present invention.

[0103] With reference to Figure 4, the human intervention in this system is conducted by a programmer or program packager operating from the one or more work stations 262 connected to the system. These work stations 262 are preferably intelligent work stations with large CRT screens. In the preferred embodiment, a suitable keyboard, mouse and color monitor are used with the workstation. From these work stations, the packager can create program lineups, prioritize programs, initiate dynamic menu allocation, initiate dynamic bandwidth allocation, design menus, place program names and descriptions onto menus, create menus with still and live video, move text on menus, change the colors of objects on menus and perform various other tasks for the program delivery system 200.

[0104] Almost any Operations Center 202 function that normally requires human intervention can be conducted at the packager workstation 262. Although data entry for the databases can be performed manually at the workstations 262, it is preferred that the data entry be completed through electronic transfers of information. Alternatively, the data can be loaded from customary portable storage media such as magnetic disks or tape.

[0105] An integral part of the Computer Assisting Packaging system is the retrieval of viewer data, and the assimilation of that data into the program packaging method (especially the menu configuration) as discussed in reference

to Figure 8 MII 402. This involves two main steps, first, retrieval of raw data from the set top terminals, and then filtering and presenting that data. Each headend 208 compiles the viewer data, and then sends it verbatim to the Operations Center 202. This raw data is necessary because different responsibilities of the Operations Center 202 require different parts of the raw information. Also a record must be kept of overall data. Once the data is assembled at the Operations

Center 202, the data is filtered for each application.

[0106] The raw data gathered includes but is not limited to:

- What programs a viewer purchased and when it was purchased
- What channel a specific viewer watched and for how long.

[0107] This information can then be used to calculate the following:

- How many viewers watched a particular program.
- Peak viewing times for different categories of shows.
- Buy rates for particular menu positions.

[0108] Menu creation, both automatically and manually, is one of the major CAP functions that involves the incorporation of the raw data. An automated software procedure (such as the EIS) analyzes the data and, using certain heuristics, creates the menus.

[0109] One heuristic, for example, is that when a show is not ordered frequently, it is moved closer to the top of the menu for greater visibility. The filtering of the data allows it to be sorted and indexed for display to the user. The program data can be filtered into a new database containing program names and indexed by the number of times each program was purchased. The data can also be indexed by buy times and program categories.

[0110] Certain metrics are established to help in evaluating the data. Using the EIS or similar software, sales by menu placement, cost, category and lifespan can be pulled up for viewing in graphic presentation. The graphic presentation, in the form of line or bar graphs, help the packager recognize any trends in the data. For example, the first movie on a movie menu might not have sold as well as a second movie listed. A chart can be pulled up to reveal that the first movie has been at the top of the menu for two weeks and buy rates are naturally falling off. Steps can then be taken to move items in the menus to correct this, though many of these steps are automated in the menu creation system. Suggested changes can be displayed to help the user in this task.

[0111] The automated procedures create menus that are distinct between head ends 208 because of demographic differences in the viewing audience. To help with this, a separate database of viewer demographics exists and is frequently updated. The headends 208 are able to alter the menu positions in order to further tailor the presentation, or to add local shows. Any changes to the menus are sent back to the Operations Center 202 at the same time as the viewer data, in order to prevent erroneous data analysis. Menu changes at the cable headend are described in detail in EP-A-0 673 579 entitled Network Controller for a Cable Television System, filed by the same assignee.

[0112] Another use for the indexed data is creation of marketing reports. Programming changes are helped by accurate information on viewer preference. Also viewer purchasing trends, and regional interests can be tracked.

[0113] In the preferred embodiment, an Executive Information System (EIS) is used to give high level access to both "buy" (what the customer purchases) and "access" (when the product was viewed, how often and duration) data. The EIS represents information in both a graphical and summary report format. "Drill down" functions in the EIS help the packager derive the appropriate product (product refers to programs, events or services) mix.

[0114] The purpose of the EIS is to provide an on-line software tool that will allow for real-time evaluation of current product positioning. The design of the system consists of user friendly icons to guide the user through available functions. The functionality in the system provides general information on current programming sales status. By working through the tiers in the system, the user has access to more specific information. The system is designed to shield the user from a long learning curve and information overload.

[0115] The graphical tools allow for analysis of current data through the use of multiple graph types such as line graphs, bar and pie charts. These tools will allow the user to manipulate independent variables such as time (hour, day of the week, week, month), demographic information, program category information (genre, property, events), headend information and pricing information for determining the appropriate programming mix within the allotted time slots.

[0116] The system also allows the packager to derive expected monetary returns through program line-ups by integrating outside industry databases. For instance, the system could be used to determine expected returns from a particular program by correlating buy information from the existing programs in the line up with a viewer ratings service database to determine the outcome of programs within a particular genre not in the current line up.

[0117] Report tools within the EIS aggregate buy access at the highest level. Due to the volume of available information statistical analysis methods are used for deriving marketing intelligence within the EIS.

[0118] A yield management tool is incorporated within the EIS. The yield management tool encompasses operations research techniques, statistical methods and neural net technology to decide program mix as it pertains to program substitutes, program complements, time slice positioning, repetitions and menu positioning.

[0119] This system is automated to the extent of providing viable alternative as to the proposed product mix. The system encompasses a Monte Carlo simulation for developing alternative product mix scenarios. The system feeds from both internal data and external industry data sources to provide expected revenue projections for the different scenarios. Other software subroutines of the CAP will automatically call upon the EIS to assist the program in important decision making, such as menu configuration and transponder allocation. Human interaction is required to change marketing parameters for fine tuning the desired product scheduling.

[0120] Although the packaging of the program information and programs, including the creation of program control information, program lineup and menu designing configuration, is conducted at the CAP 260, all other functions of the Operations Center 202 can be controlled by a second separate processing unit (shown in Figure 5 at 270). This second processing unit 270 is the Delivery Control Processing Unit 270, and can perform the tasks of incorporating the program control information signal from the CAP 260, coordinating the receipt and combining of external program video/audio and internal video/audio and combining the signals as necessary for transmission. This distribution of functions among the CAP 260 and Delivery Control Processing Unit 270 allows for greater speed and ease of use.

[0121] Figure 5 shows a more detailed diagram of the CAP 260 and the Delivery Control Processor Unit 270. Once external and stored digital and analog sources have been converted into a standard digital format 274, they are input into standard digital multiplex equipment 273 (of the type manufactured by Scientific Atlanta, General Instruments, and others). Additionally, the Program Control Information Signal 276 is input into the digital multiplex equipment 273. These inputs 274, 276 are multiplexed appropriately under the control of the Delivery Control Processor Unit 270 as commanded by the CPU 264. The Delivery Control Processor Unit 270 is also responsible for the generation of the Program Control Information Signal 276 based on information received from the CPU 264. The Delivery Control Processor Unit 270 allows for the off-loading of real-time and near real-time tasks from the CPU 264. The CPU 264, as described earlier, processes information within its database and provides user access to the CAP 260 via multiple user workstations 262. The high-speed digital output 278 from the digital multiplex equipment 273 is then sent on to the compression (if necessary), multiplexing, modulation and amplification hardware, represented at 279.

C. The Program Control Information Signal

[0122] The following table, TABLE A, is an example of some information that can be sent in the program control information signal to the set top terminals 220. The program control information signal generated by the Operations Center 202 provides data on the scheduling and description of programs via the network controller 214 or, in an alternate configuration, directly to the set top terminal 220 for display to the subscriber.

[0123] In the preferred embodiment, the program control information signal 276 is stored and modified by the network controller 214 and sent to the set top terminal 220 in the form of a set top terminal control information stream (STTCIS). This configuration accommodates differences in individual cable systems and possible differences in set top converter or terminal devices. The set top terminal 220 of the present invention integrates either the program control signal 276 or the STTCIS, together with data stored in the memory of the set top terminal 220, to generate on-screen menu displays for assisting the subscriber in choosing programs for viewing. (Throughout the description the term "program control information" is being used to indicate control information coming from the cable head end 208 to the set top terminal 220, whether it is sent directly from the Operations Center 202, processed by the network controller 214, and then forwarded to the set top terminal as STTCIS, or transmitted over telephone lines.)

[0124] With further reference to TABLE A below, the types of information that can be sent via the program control signal include: number of program categories, names of program categories, what channels are assigned to a specific category (such as specialty channels), names of channels, names of programs on each channel, program start times, length of programs, description of programs, menu assignment for each program, pricing, whether there is a sample video clip for advertisement for the program, and any other program, menu or product information.

[0125] The goal of the menu driven program selection system of the present invention, described in greater detail in EP-A-0 673 581 entitled SET TOP TERMINAL FOR CABLE TELEVISION DELIVERY SYSTEM, owned by the assignee of the present invention and incorporated herein by reference, is to allow the subscriber to choose a program by touring through a series of menus utilizing a remote control 900 for cursor movement. The final choice in the series of menus will identify one particular channel and one time for activation of that channel. Armed with a channel and activation time the set top terminal 220 can display the selected program on the television for the viewer. To achieve this goal, an intelligent alpha-numeric code is assigned to each program. This alpha-numeric code identifies the category of the program, the menu in which the program should be displayed, its transmission time(s), and the position on the menu that the program should be displayed. In a preferred embodiment, the program control information, including menu codes, is sent continuously from the Operations Center 202 to the network controller 214, and ultimately

to the set top terminal 220. For example, four hours worth of programming information can be sent via the program control information signal continuously in the format shown in TABLE A.

TABLE A

12:00 PM					
	*Program name	*Program length	*Menu code	*Description	*Video
1	Cheers	.5	E24	C	N
2	Terminator	2.0	A33	Tx	S
3	Prime Time	1.0	D14	N	N
4	Football Special	.5	B24	S	N
•					
•					
•					
•					
12:30PM					
	*Program name	*Program length	*Menu code	*Description	*Video
1	Simpsons	.5	E14 & C13	C	S
4	Football Game	3.0	B13	S	N
•					
•					
•					

[0126] TABLE A shows the basic information that is needed by the set top terminal 220. The program descriptions shown are coded abbreviations. For example, C stands for comedy, N for news, S for sports, A for cartoons, and TX for text. If there is a textual description for a program, such as a movie, the description may be given following that program's coded description or may be communicated following the four hours of programming information. As is shown in the coded listing, program descriptions for programs greater than a half hour in length need not be repeated (each half hour). The video description code informs the set top terminal 220 whether there is still or live video available to advertise the program.

[0127] For example, a sporting program may be assigned a code of B35-010194-1600-3.25-Michigan St. vs. USC. The letter B would assign the program to category B, sports. The second alpha-numeric character number 3 would assign the program to the third menu of the sports category. The third character of the code, number 5, assigns the program to the fifth program slot on the third menu. The next six characters, 01/01/94, represent the date. The following four characters, 1600 represent the start time which is followed by the length of the program and the program name. This entry represents a sports show, a college football game, which will be aired at 4:00PM on New Years day 1994.

[0128] In the 12:30 Channel 1 entry of TABLE A, two menu codes are shown. By allowing two menu codes, programs that may fit under two different category descriptions may be shown in both menus to the subscriber. With this minimal amount of information being communicated to the set top terminal 220 on a regular basis, the terminal is able to determine the proper menu location for each program and the proper time and channel to activate for the subscriber after his menu selection. In the preferred embodiment, the menu codes are generated at the Operations Center 202.

[0129] Table B shows an example Events Table that may be downloaded to a set top terminal 220 using the Event Data file which contains information about events and pricing. As shown in the table, the three columns of the Events Table identify the field number, the field itself and the type of information downloaded in the Event Data file. The first column contains the field numbers 1 through 11. The middle column contains the corresponding field parameters, including the event type, event ID, global channel ID, price, start time, end time, start date, end date, P- icon, name and description. The third column contains corresponding field type information. As shown in this field type information typically consists of an unsigned integer; hours, minutes and seconds; months, day and year; and ASCII character identifier.

TABLE B

Field #	Field	Type
1	Event type 1 = YCTV 2 = Pay-Per-View 3 = Reg. TV	Unsigned Int
2	Event ID	Unsigned Int
3	Global Channel ID	Unsigned Int
4	Price (in Cents)	Unsigned Int
5	Start Time	HH:MM:SS
6	End Time	HH:MM:SS
7	Start Date	MM/DD/YY
8	End Date	MM/DD/YY
9	P-Icon	ASCIIZ
10	Name	ASCIIZ
11	Description	ASCIIZ

[0130] Table C shows an example Event Data data file. In particular, Table C shows two data streams corresponding to two event types. The first data stream identifies a YCTV event in the first field. The second field designates the event ID, which is 1234 in this example. The third field includes the global channel ID number two. The fourth field indicates the cost of 50 cents for this event. The fifth and sixth fields indicate the respective start and end times of 3:00 a.m. to 3:00 p.m., respectively. The seventh and eighth fields show the corresponding start and end date, designated as 8/25/93 and 8/27/93, respectively. Field nine indicates the P icon set to a graphics file. Finally, fields ten and eleven indicate the name and description of the event selected, which in this case is Sesame Street™ and Barney™. The second data stream in the Event.Dat example shown in Table C includes analogous information for Terminator IV™, which is designated in field one as a pay-per-view event.

TABLE C

Event Data Example

1	1234	2	50	03:00:00	15:00:00	08/25/93	08/27/93	pbs.pcx	Sesame Street & Barney's	Sesame Street and Barney Abstract
2	1234	2	50	20:00:00	22:00:00	08/25/93	08/25/93	t4.pcx	Terminator 4	Terminator 4 Abstract

[0131] The program control information signal 276 and STTCIS can be formatted in a variety of ways and the on-screen menus can be produced in many different ways. For instance, if the program control information signal 276 carries no menu format information, the menu format for creating the menus can be fixed in ROM at the set top terminal 220. This method allows the program control signal 276 to carry less information but has the least flexibility since the menu formats cannot be changed without physically swapping the ROM holding the menu format information. In the preferred embodiment, the menu format information is stored at the set top terminal 220 in temporary memory either in a RAM or EPROM. This configuration provides the desired flexibility in the menu format while still limiting the amount of information needed to be communicated via the program control information signal 276. New menu format information would be sent via the program control information signal 276 or the STTCIS to the set top terminals 220 each time there was a change to a menu.

[0132] In the simplest embodiment, the menus remain fixed and only the text changes. Thus, the program control information signal 276 can be limited to primarily text and a text generator can be employed in the set top terminal 220. This simple embodiment keeps the cost of the set top terminal 220 low and limits the bandwidth necessary for the program control information. Another simple embodiment uses a separate channel full-time (large bandwidth) just for the menu information.

[0133] Figures 6a and 6b, particularly Figure 6a, show a data format 920 at the bit-level for one embodiment of a program information signal 276. This frame format consists of six fields, namely: (1) a leading flag 922 at the beginning of the message, (2) an address field 924, (3) a subscriber region designation 926, (4) a set top terminal identifier 928 that includes a polling command/response (or P/F) bit 930, (5) an information field 932, and (6) a trailing flag 934 at the end of the message.

[0134] The eight-bit flag sequence that appears at the beginning 922 and end 927 of a frame is used to establish and maintain synchronization. Such a sequence typically consists of a "01111110" bit-stream. The address field 924 designates a 4-bit address for a given set top terminal 220. The subscriber region designation 926 is a 4-bit field that indicates the geographical region in which the subscriber's set top terminal 220 is housed. The set top terminal identifier 928 is a 16-bit field that uniquely identifies each set top terminal 220 with a 15-bit designation followed by an appended P/F bit 930. Although field size is provided by this example, a variety of sizes can be used with the present invention.

[0135] The P/F bit 930 is used to command a polling response 920' (Figure 6b) from the set top terminal 220 addressed. The polling response 920' is substantially similar to the from format 920, and is commonly numbered, but with a prime (') designation appended for clarity. The frame format 920 also provides a variable-length information field 932 for other data transmissions, such as information on system updates. The frame format ends with an 8-bit flag 934 (or trailing flag) that is identical in format to the leading flag 922, as set forth above. Other frame formats, such as MPEG, for example, will be apparent to one skilled in the art and can be easily adapted for use with the system.

D. Software Subroutines

[0136] The program control information signal 276 is produced substantially by the CAP CPU 264 and the Delivery Control Processor Unit (DCPU) 270. An overview of the software modules, focusing on the processing of signals and communication between CAP CPU 264 and DCPU 270 is shown in Figure 7. The software modules for the CAP CPU 264 and DCPU 270 include dispatcher 484, processing 486 and communications 488, each of which performs like-named functions, as well as supporting database 490 access. Processing within the CAP CPU 264 is controlled by the dispatcher 484 software module which may generate processing commands based on user command (e.g., do something now), schedule events (e.g., do something at noon) or based on the occurrence of other events (e.g., do something when the database is updated). The dispatcher 484 sends messages to the processing software module 486 instructing it to process information within the database 490 and generate control information for the DCPU 270. For example, based on the updating of information associated with a particular head end 208, the dispatcher 484 may command the CAP CPU 264 to regenerate headend 208 parameters, perform any required database integrity checking and send them to the DCPU 270. Also, in the case of headend 208 information processing, a filtering function (not shown) is performed which eliminates any information that does not either directly or indirectly relate to a given headend 208. Information transfer between the CAP CPU 264 and the DCPU 270 is controlled by the DCPU communications software module 488.

[0137] Information received by the DCPU 270 from the CAP CPU 264 is processed at the DCPU processing module 496 and put into a form consistent with the DCPU 270. Some of this information is used for DCPU control, while most is data to be integrated into the program control information signal 261. Some of this information is also used for miscellaneous control 494 for such things as external multiplex equipment, source material generation hardware, transmission equipment and so on. Information destined for the program control information signal 261 may be transmitted once or may be scheduled for periodic transmission. This information is integrated by the processing module 496 with other information, both internal and external. The DCPU scheduler module 497 is responsible for scheduling and regulating this data traffic. Also, the scheduler 497 may perform information filtering. For example, imbedded date/time information within the information records of interest can be used for filtering. External pass-through control information 495 may also be incorporated into the program control information signal 261 to provide external input to this digital data stream. The DCPU multiplexer 498 is responsible for multiplexing external pass-through control information. Finally, a transmission software module 499 in conjunction with appropriate communications hardware (not shown), controls the output of both the program control information signal 261 and the miscellaneous control signals 494.

[0138] Figure 8 is a high level diagram of CAP software subroutines and their interrelations. A Main Program (not shown) orchestrates the use of the various subroutines as needed to perform the CAP's tasks. The Packager Data Entry Interface (PDEI) 400, Marketing Information Interface (MII) 402, and Cable Franchise Information Access (CFIA) 404 subroutines perform the interface functions between the CAP Main Program and outside data or information. The remaining subroutines shown in the center column of Figure 8 perform the processing and manipulations necessary to the functioning of the CAP 260.

[0139] The Packager Data Entry Interface (PDEI) 400 subroutine includes routines that enable the Packager to interactively enter program selections 410, start times of programs 412, price setting 414, transponder allocation 416, and menu editing 418. The PDEI subroutine 400 controls the keyboard and mouse data entry by the packager and runs in concert with the processing and editing subroutines described later.

[0140] The Marketing Information Interface (MII) 402 subroutine interfaces the processing and editing subroutines with marketing data. This interface regularly receives programs watched information from billing sites 420, cable head-ends 208, or set top terminals 220. In addition, other marketing information 422 such as the demographics of viewers during certain time periods may be received by the MII 402. The MII 402 also uses algorithms 424 to analyze the program watched information and marketing data 420, 422, and provides the analyzed information to the processing and editing subroutines. In the preferred embodiment, an Executive Information System (EIS) with a yield management subsystem is included in the MII subroutine as described above.

[0141] The Cable Franchise Information Access (CFIA) 404 subroutine receives information on cable franchises, as represented at block 426, such as the particular equipment used in a cable headend 208, the number of set top terminals 220 within a cable franchise, groupings of set top terminals 220 on concatenated cable systems 210, distribution of "high-end" cable subscribers, etc. The CFIA 404 generates a cable franchise control signal 428 which is integrated with the program control information 276 output to generate cable headend 208 specific information to be transmitted. The integration algorithm for accomplishing this resides within the Generator subroutine described herein below.

[0142] The process program line-up subroutine 430 uses information from the MII 404 and PDEI 400 to develop a program line-up. Importance weighting algorithms and best fit time algorithms are used to assign programs in time slots.

[0143] The process menu configurations subroutine 432 determines appropriate menu formats to be used and positions programs on menu screens. Information from the MII 404 and PDEI 400 are used to determine program positions on menus.

[0144] The menu display algorithms 434 displays menus as the menus would be seen by the viewer on a large CRT or color monitor.

[0145] The editing of menus subroutine 436 works with the menu display algorithm and PDEI 400 to allow the packager to edit menus on-the-fly during viewing of the menus.

[0146] The graphical transponder allocation display 438 sends information obtained from the CFIA 404 and PDEI 400 to create graphical displays enabling the packager to comprehend the allocation of transponder space across the entire television delivery system 200.

[0147] In a manner similar to the display and editing of menus represented at blocks 434, 436, the packager may utilize the editing transponder allocation subroutine 440 to interactively reallocate assignment of transponder space. In the preferred embodiment, the EIS with yield management may be used by the packager to assist in decisions on allocating transponder space.

[0148] The generator subroutine 442 creates the program control information signal for output. The Generator subroutine receives the cable franchise control signal and uses this signal to help create a custom signal for each cable headend 208.

[0149] The Packaging Routine 448 obtains and packages the programs, along with the program control information signal 216, for transmission to the transponders.

[0150] With continued reference to Figures 7, 8 and 9, the general software flow of the operations center 202 is depicted. The flow can be broken up into modules that apply to parts of the database to allow viewing, editing, and adding records to the database. The software also accomplishes database integrity checking by restricting the user to enter only valid data, and by checking for conflicts.

[0151] Figure 9 shows some of the software involved in the creation of programs, events and services. This creation occurs prior to or during the processing of the program line-up 430 shown in Figure 8. With reference to Figure 9, a first step is indicated generally at 461 and includes acquiring source materials for program production at the Operations Center 202 (e.g., tape production). Once the source materials are collected 460, and entered into the database "D", they can be used to create programs 462. These programs are made up of source 'cuts' from various video/audio source materials. Once the programs have been generated and entered into the database "D", events, collections of one or more programs, are created 464. Each event is then schedule onto a service 466, with the software checking for conflicts. Each service is given run times, and days, and checked for conflicts. Once the services and events have been created, the event names can be added to the menus 468. The programs for the events and services may be stored at the Operations Center (as shown in Figure 11 at 286). Processing and manipulation of the events or records is depicted generally at 463.

[0152] The packager user interface (a portion of 463) for each of the creation modules works substantially identically to each of the other modules to make the interface easy to use and learn. The packager user interfaces forms a portion of the PDEI 400 shown on Figure 8. The browse system 470 is entered first and allows viewing of records, and selection of specific records. The database can be 'populated' by selection of a button, which activates a populate screen. As represented at block 471, this allows details to be deleted, added or changed for events, programs, and sources. The browse screen also allows access to the edit screen 472, where fields in a selected record can be modified, with conflicts or errors, in scheduling for example, being checked continuously, as at 473 and 474.

[0153] In use, the Operations Center 202 of the present invention performs a variety of management functions which can be broken out into five primary areas: (1) cable headend 208 management, (2) program source management, (3)

broadcast program management, (4) internal program storage and management, and (5) marketing, management and customer information. A relational database, such as that represented by Figure 10, can be used to maintain the data associated with these areas.

[0154] Customer billing is not included in any of the above five areas for the Operations Center 202. Although billing can be handled by the Operations Center 202 (as shown in the database structure 508, 511), it is preferred that billing is handled at a remote location through traditional channels and methods (such as Cable TV billing provided by Telecorp corporation). Extracts of customer purchases will be provided to the Operations Center 202. These extracts of information will be formatted and correlated with customer demographics for marketing purposes by the Marketing Information Interface (MII) 402.

(1) Cable Headend Management

[0155] Management of the cable headend 208 includes the following activities: defining the cable headend site; profiling the viewers; determining available set top equipment; defining the concatenated cable systems connected to the cable headend site. This information may be stored as cable franchise information within the Operations Center 202 database by the Cable Franchise Information Access routine 404. Such information can be compiled and maintained in a relational database (described below and shown as 328 in Figure 11).

(2) Program Source Management

[0156] Source programs will be provided by a variety of networks. Information from the contractual records to the actual program tapes should be maintained and includes: tracking of property rights; tracking and profiling source tapes; profiling source providers. A relational database (such as "D" shown in Figure 9) can be used, for example, that identifies and correlates programs sources. Programs may be received from various rights holders, and such a database would track the person or entity that owns the rights to each program at issue. Other data could be maintained relating to program cuts (a program cut is a portion of a program) that specifies, for example, the program from which the cut is taken. Information relating to time slot allocations, menu entries, and categories, and channel assignments are also maintained in the relational database.

[0157] Program services represents a purchasable time slice which is occupied by a type of programming. Each time slice has multiple time constraints. Using the purchasing of through time slices allows for great flexibility. An infinite number of program and time slice combinations are possible. Preferably, services are created using the software shown in Figure 9, particularly the service creation routine 466. For a service to become available at a cable headend 208 site, it is mapped to the site. At the time of mapping the program service is assigned a program channel.

[0158] Program services are defined by the following fields:

Service ID	System generated unique ID
Description	Describes the service. The description will allow the packager to easily assign a service to a broadcast program.
Type	Defines the type of service. Current service types include YCTV™, Grid, Network and Other.
Network ID	Relevant for network services. (examples: ABC, NBC, DISC™)
Broadcast Event	Relevant for a YCTV™ service. Identifies the current YCTV™ broadcast event assigned to the service.
PICON File	Name of the picture icon (PICON) assigned to the service. This picon is displayed for example on the buy screen for a pay per view event.
Expiration Date	Expiration date of the service. Removes the service from the service selection list.
Day Start	Each service is a series of days within a week. This represents the starting day. (example: Monday)
Day Stop Time Start	Represents the last day in the interval. Within a day, the service has a time period. This field represents the start of the period.
Time Stop	Represents the end of the time period.
Required Tape	If stored tapes are required, the number of tapes required by the service.

(3) Broadcast Program Management

[0159] Broadcast program management is one focal point of the data management system. The issues of product, price, promotion and packaging are addressed at this level. Decisions in these areas will affect the actual programming

that will be shown to the viewers. Information on description of the content of each program event, program scheduling, broadcast program pricing, TV/set top information flow and information on how broadcast programs will be mapped to viewer channels should be included in the database. Preferably, the EIS system described below will access this data and assist in the Broadcast Program Management.

(4) Internal Program Management

[0160] Information on internally stored programs at the Operations Center 202 should also be maintained. This will allow the Operations Center 202 to assemble electronically stored programs, CD stored programs and program tapes, and ensure the quality of programs and location of programs.

(5) Marketing And Customer Information

[0161] Last, and important, marketing and customer information should be maintained. In order to effectively manage the operations, information is constantly needed on market conditions. Information is needed on the existence of markets for certain programs. The following type of information must be maintained in a Marketing and Customer Information data base: demographic profile of viewers, viewer buy information; correlation of demographic information with buy information, information rapid restructuring of program mix in response to data analysis. As a subscriber uses the system, this viewer information or viewer log data can be stored and maintained in relational database. The Marketing Information Interface 402 gathers the marketing information and indexes the information for inclusion in the Marketing and Customer Information database. An example of the type of information that is needed in this data base is a viewer profile.

[0162] The viewer profile data fields are an example of typical fields required in the databases. Definitions of various fields are listed below. The primary purpose of profiling the viewer is to acquire marketing information on the viewer's response to available selections. Ancillary information will be available including the actual program and channel selections of the viewer. Information tracked within the viewer's profile includes:

Viewer ID	A unique identifier generated by the system.
Set-Top Types	Boolean field which identifies the type of set top used.
Headend ID	Links the viewer to a particular cable site.
Site Assigned ID	Viewer ID assigned by the cable site.
Set-Top ID	ID of the viewer's set top.
Hookup Date	Date physical hardware is connected.
Survey Date	A demographic profile will be conducted on each user. The following fields represent this demographic information. The data represents when the interview survey was completed.
Viewers Age 2-5	Boolean field if the household has viewers between 2 and 5 years of age.
Viewers Age 6-11	Boolean field if the household has viewers between 6 and 11 years of age.
Viewers Age 12-17	Boolean field if the household has viewers between 12 and 17 years of age.
Tape Rental \$	Approximate amount spent on tape rentals on a monthly basis.
PPV \$	Household average pay-pre-view expenditures per month.
Income	Annual household income.
Zip Code	Self-explanatory.
Cable Tier	Level of cable service purchased.
Number of TV's	Self-Explanatory.
Years with Cable	Self-Explanatory.
Occupancy	Number of people in household.
Highest Education	Highest level of education of any member of the household.

[0163] The compilation of viewer demographic information has an impact on decisions based on marketing. The names of the heads of household are not used due to Privacy Act considerations. Completion of demographic data can be accomplished referencing the cable site assigned ID or the system generated ID. There are numerous variations to the field definitions listed above such as different age groupings.

[0164] To maintain the database at the Operations Center 202, a data base server, communications server, user work station or stations 262, or the suitable equivalent thereof, are needed. The database server performs the following functions: it is the repository for data base files, event logging, event scheduling (example, automated download of

files to headends 208), multi-user services, data base server services, and data base security access.

[0165] The communications server performs the following functions on data base data: integrity check, filtering, processing, downloading to head ends 208, uploading from headends 208, and uploading from remote location.

[0166] User work stations 262 perform the following tasks: creation, deletion and access of all database data, system administration and report generation. Database manipulations are performed through the user workstations or remotely. The database structure is designed to support multiple users performing multiple tasks simultaneously. The preferred embodiment includes a network of user workstations 262. The workstations 262, through user interface software, access data within database files on the database server.

[0167] For example, once the appropriate database data has been generated for downloading to a cable headend 208, the communications server is instructed to perform the download. Although this may be done manually at the communications server, it is preferred that the communications server automatically send information to the cable headends 208. The communications server retrieves required data from the database server, filters out any data not associated with the specified headend 208, and performs data integrity checks, creates data files to be downloaded and then downloads the data file via modem (or other means such as the DCPU 270). While the communication server is connected with the headend 208, it also requests any data that the head end might be holding for the Operations Center 202. This may consist of cable headend 208 event log information, set top billing and viewer log data on programs watched, etc.

[0168] The communications server may also assist in retrieving information from other remote sites such as remote billing and statistic sites. For example, if a location is being used for billing purposes, the communications server may retrieve viewer log data. Also, the communications server may retrieve billing and viewer log data from actual set top converters in the field. Once the data is retrieved it is sent to the database server. Thus, in the preferred embodiment the communications server will support incoming information via modem or otherwise.

[0169] The basic database structure at the Operations Center 202 consists of multiple tables. Database data tables contain one or more data records, each with multiple fields. Each field contains a piece of data about the particular record. This data may be general information, such as a numeric value, date or text string, or it may be a reference to another database record relating one piece of data to another. Database index files contain information about associated data files to allow for improved data retrieval. The database index file makes retrieval of information much quicker.

[0170] In an alternative embodiment where some television programming begins with the procurement of source material in the form of tapes or CDs, additional data about the tapes or CDs may be stored in the Operations Center database. Each tape or CD may have a database record associated with it. source tape data file. Each tape may contain multiple cuts of which each cut has an associated record in a source tape detailed data file. Additionally, a company data file may contain individual records for the rights of the holders of the source tapes as well as company information about cable headends 208. In this alternative embodiment with tapes, programs may be created from multiple tapes using multiple tape source cuts. The programs created by these source cuts may be stored and the individual cuts that make up the programs may be stored in a database record called "program tape detail." Events may be created that consist of more than one program and details on individual programs that make up these events may be stored in a database file called "event detail." Using this embodiment, events may be sold to subscribers.

[0171] Figure 10 and the description below is a more complete example of a database structure that can be used with the present invention. Each database file is listed below along with a description, record field details and explanation of relationships. The software data structures are defined after the description of the database structure.

[0172] The SCHEDULE Database file 501 contains scheduling data for a single day. There are many schedule files, one for each day of schedule information. The actual filename for a given days schedule is assigned under computer control. Schedules are broken up into single days so they may be easily created, dispatched and archived. A cross-reference of days to computer generated filenames is kept. Each scheduled event (either a program or a preview) has its own record entry and unique schedule ID This record references the corresponding scheduled program or preview and program type (either program or preview). The service to carry the scheduled program is also referenced. The starting date and time is also specified. Program duration is stored as a program attribute and is not included here. Note that program, preview and service records must be provisioned before they may be referenced in a schedule record.

[0173] Another SCHEDULE Database file 500 contains a cross-reference of starting dates data to computer generated filenames.

[0174] The PROGRAM Database file 502 contains Program records are contained in another database file 502, with each record representing a source program. Each program has a unique program ID. If the program has a corresponding preview, it is also referenced. Program category and price are also referenced. The structure of the program category database may be modified if multiple categories per program are desired. Program name, description and duration are also given. Note that preview, program category and price category records must be provisioned before they may be referenced in a program record.

[0175] The SERVICE Database file 503 contains service records with each record representing an available service.

A service may be thought of as a virtual video channel. Virtual channels are non-existent channels which are mapped or created by hardware and software and is described in EP-A-0 673 583 entitled ADVANCED SET TOP TERMINAL FOR A CABLE TELEVISION DELIVERY SYSTEM, incorporated herein by reference. Services are then mapped into local headend channels. Since initial distribution of video source material may be by "Federal Express" instead of a video channel, a service ID is used to identify the virtual channel being used for the desired service. "60 Minutes" could be distributed and then be mapped into any desired local headend channel. The service database exists at both the national site and at each local headend 208. Every service has a name, call letters and a description of the service. Every service also has an assigned local channel, "A" tape (or CD) machine ID and "B" tape (or CD) machine ID. Note that these last three parameters only apply to the service databases at the local headends 208. The local headend service database performs an equivalent function of a "channel map." For a further description of the cable head end function, see EP-A-0 673 579 entitled NETWORK CONTROLLER FOR A CABLE TELEVISION DELIVERY SYSTEM, filed by the same assignee.

[0176] The PREVIEW Database file 504 contains preview records with each record representing a source preview. A preview is like a program that is scheduled and distributed over a service. It differs from a program in that multiple previews may be distributed over the same service at the same time. Also, previews are free. Each preview specifies its location on the TV screen. This is generally done by selecting from a menu of valid screen positions. Unlike programs, previews do not reference program and price categories or other previews.

[0177] The PROGRAM CATEGORY Database file 505 contains program category records with each record representing a valid program category. Examples of program categories are movies, sports, educational and news. Multiple program categories per program may be accommodated if desired with simple changes to the database structure.

[0178] The PRICE CATEGORY Database file 506 contains price category records with each record representing a valid price category. Price categories are used to provide pricing consistency throughout the system. It also provides flexibility at the headend 208 to price various categories differently should this be desired. For example, distributed movies may be assigned the price category "movie" at the national site. Each head end 208 could then charge differing amounts for their movies by manipulating their local price category database. If a current price structure needed to be changed, the change would be made once in the price category database instead of in each program record.

[0179] The EVENT LOG Database file 510 contains event data for a single day. There are many event files, one for each day of event information. The actual filename for a given days events is assigned under computer control. Events are broken up into single days so they may be easily archived. A cross-reference of days to computer generated filenames is kept.

[0180] Each event record contains a unique ID, an event code, ID of the process that generated the event and date/time stamp of the event.

[0181] The EVENT LOG FILENAME Database file 507 contains a cross-reference of start date to computer generated filenames.

[0182] The VIEWER LOG Database file 512 contains viewer log data for a single day. There are many viewer log files, one for each day of viewer log information. The actual filename for a given days viewer log data is assigned under computer control. Viewer log data is broken up into single days so it may be easily archived. A cross-reference of days to computer generated filenames is kept.

[0183] Each event record contains a unique ID, an event code, ID of the process that generated the event and date/time stamp of the event. The Marketing Information Interface 402 accesses the VIEWER LOG Database file as necessary to retrieve "program watched" information 420.

[0184] The VIEWER LOG FILENAME Database file 509 contains a cross-reference of date to computer generated filenames.

[0185] The BILLING Database file 511 contains billing data for a single day. There are many billing files, one for each day of billing information. The actual filename for a given days billing data is assigned under computer control. Billing data is broken up into single days so it may be easily archived. A cross-reference of days to computer generated filenames is kept.

[0186] Each event record contains a unique ID, an event code, ID of the process that generated the event and date/time stamp of the event.

[0187] The BILLING FILENAME Database file 508 contains a cross-reference of start date to computer generated filenames.

[0188] The NEWS FILENAME Database file 509 contains a cross-reference of date to computer generated filenames.

[0189] The SET TOP Database file 517 contains set top converter records with each record representing a unique set top converter. Each set top is assigned to a headend 208. Set-top type, software version and serial number is also stored. Note that headend records must be provisioned before they may be referenced in a set top record.

[0190] The HEAD END Database file 518 contains headend records with each record containing head end 208 data specific to a single headend 208. Each headend 208 has a name, contact name, address, phone number, modem information, time zone (relative to GMT) and daylight savings time flag. This information may be stored in a separate

database file called Cable Franchise Configuration (shown as 328 in Figure 11).

[0191] The NATIONAL Database file 515 contains a single record containing national site information. This includes site name, contact, modem information, time zone and daylight savings time flag.

[0192] The CUSTOMER Database file 516 contains customer records with each record containing customer data specific to a single customer. This includes personal information (name, address, phone number, . . .) and assigned set top converter.

[0193] The TAPE MACHINE Database file 519 contains video tape or CD machine information. Each machine is assigned a unique ID, its control port address, its A/B switch address (if present), its assigned service and an A/B assignment. This database is only located at the headends 208.

[0194] The MESSAGE Database file 514 contains available system messages. They are detailed in nature and are preprogrammed. Each message has an associated function. To schedule a desired function, the appropriate message is referenced in the scheduler task list.

[0195] The TASK Database file 513 contains scheduled tasks to be performed periodically. It is used in conjunction with a scheduler process to control computer system functions such as data dispatch and retrieval, archival and database maintenance. Each task is assigned a unique ID, start time, stop time, period in minutes and task type (single, periodic, round-robin). Functions are actually scheduled by scheduling the appropriate message to be sent to the appropriate process. Available messages are kept in a separate database. Note that these messages must be provisioned before they may be referenced in a task record.

E. System Operations

[0196] Figure 11 shows the basic operations that must occur in order for the packaged signal to be sent to the satellite 206. External digital 280 and analog signals 282 must be received from television programming sources and converted to a standard digital format by a converter 284, as described above. Also within the Operations Center 202, stored programs 286 must be accessed using banks of looping tape machines or other video storage/retrieval devices, either analog or digital, and converted to a standard digital format by the converter 284 prior to use by the CAP 260.

[0197] The programmer or program packager utilizing the CAP 260 must input a variety of information, including program information, in order to allow the CAP 260 to perform its function of generating program control information and packaging programs. Some of the information required by the CAP 260 are the date, time slots and program categories desired by the television programmer.

[0198] The CAP 260 system includes one or more CPUs and one or more programmer/packager consoles, together identified in Figure 4 as workstations 262. In the preferred embodiment, each packager console includes one or more CRT screens, a keyboard, a mouse (or cursor movement), and standard video editing equipment. In large Operations Centers 202, multiple packager consoles 262 may be needed for the CAP 260.

[0199] As shown in Figure 12, the first step in the operation of the CAP 260 is selecting the type of programming 300 which will be packaged. Basically there are six broad categories in which most television programming can be classified: static programming 302, interactive services 304, pay per view 306, live sports specials 308, mini pays 310, and data services 312. Static programs are programs which will show repetitively over a period of time such as a day or week. Static programs include movies showing repetitively on movie channels, children's programs, documentaries, news, entertainment. Program services, with defined start and end time periods, behave like static programs and may be handled in a similar manner.

[0200] Interactive services 304 typically include interactive programs using the Vertical Blanking Interval (VBI) or other data streams synchronized with the programming to communicate interactive features (such as those used in education), and games. Using this feature, interactive home shopping programs are possible. Pay per view 306 are programs which are individually ordered by the subscriber. After ordering, the subscriber is authorized to access the program for a limited time, (e.g. three hours, two days, etc.). Live sports specials are live events usually related to sports which subscribers are unlikely to watch on taped delay.

[0201] Mini pays 310 are channels to which existing set top converter boxes (not shown) and the set top terminals 220 of the present invention may subscribe. The subscriptions for mini pays 310 may be daily, weekly, or monthly. An example would be the Science Fiction channel. Data services 312 are services in which information is interactively presented to the subscriber using a modem or other high rate of speed data transfer. Some examples are Prodigy, services for airline reservations, and TV guide services (e.g. TV Guide X*PRESS™, InSight™, etc.). Data could also include classified or other forms of advertising.

[0202] The packager begins the CAP processing using the Packager Data Entry Interface Software 400 and a workstation 262. After selecting the type of programming, the packager must identify a pool of programs (within a category) to be packaged. The next CAP step varies for different program categories. For the category of live sports 308, additional program interstitial elements 314 such as promos and other sports news may be added before further processing. For the live sports 308, static (or program service) 302, interactive services 304 and pay per view 306 categories, the next

CAP 260 step is for one television program to be selected 316. This is followed by each program individually being assigned dates to be played, a start date (for continuous play) and start times 318. Many dates and start times may be assigned to any given program. Using this methodology, programs may be purchased by viewers in time slices (e. g., one week). The program information for these categories may then be processed for allocation of transponder space and setting of prices, as indicated at blocks 320, 322, respectively.

[0203] Mini pays 310 and data services 312 require less processing by the CAP 260. After identifying the mini pays 310, the CAP 260 may proceed to allocation of transponder space and pricing, block 320, for the mini pays 310. Data services in the preferred embodiment generally do not require allocation of transponder space and generally do not require price setting. The information for data services 312 may be directly processed for menu configuration, block 324. In alternate embodiments, the data services 312 may be processed through these portions of the CAP 260 program.

[0204] The CAP 260 uses an interactive algorithm 416 to allocate transponder space 320 and set prices 322. The factors weighed by the algorithm are: 1. buy rates of the program, 2. margin of profit on the program, 3. length of the program, 4. any contractual requirement which overrides other factors (such as requirement to run a specific football game live in its entirety). The information on buy rates of the program may be obtained by the Marketing Information Interface 400 from a Central Statistical and Billing Site, a Regional Statistical and Billing Site, the cable headend 208 or directly from the set top terminals 220 as will be described later. The CAP 260 must consider the priority levels of programming (e.g., Figure 16) when allocating transponder space. Particularly, as in the preferred embodiment, transponders are assigned to three specific priority levels. The CAP may automatically (without packager intervention) access the MII 400 and the EIS to obtain necessary decision making information on transponder allocation.

[0205] Following transponder allocation and price setting 320, 322, respectively, the CAP 260 proceeds to menu configuration 324. The positioning of programs within the menu configuration 324 can have an effect on subscriber buy rates for the program. (The processing of menu configurations 432 is also described in reference to Figure 8.) Therefore, an algorithm accounting for either a manually assigned program importance or a calculated weight of the program importance is used to determine each programs position within the menu scheme. For instance, a popular program with a high profit margin may be assigned a high weight of importance and shown in a prominent place in the menu scheme. Alternatively, a high profit program with sagging sales may be manually assigned a prominent place in the program schedule to increase sales.

[0206] After a series of entries by the programmer/packager at the Operations Center 202, the CAP 260 displays draft menus 434 or schedules (including priority levels) for programming. The packager may now manipulate the menus and schedules and make changes as necessary 436. After each change, the packager may again display the menus or schedules and determine if any more changes are necessary 436. The packager may use the Executive Information System with yield management as described below to assist in editing the menus and schedules. When the packager is satisfied with the menu configuration 324 and scheduling of television programs, the packager may then instruct the CAP 260 to complete the process.

[0207] After menu configuration 324, the CAP 260 may begin the process of generating a program control information signal 326 (see also Figure 8 software description at 442 and 404). In order to generate program control information signals 326 which are specific to a particular cable headend 208 system, the CAP 260 incorporates cable franchise configuration information 328. In the preferred embodiment, unique cable franchise configuration information 328 is stored at the Operations Center 202. The cable franchises upload changes to their specific franchise information 426 from time to time to the Operations Center 202 for storage 328. Preferably, a separate CPU (not shown) handles the management of the cable franchise information 328. From the stored cable franchise information 328, the CAP 260 generates a cable franchise control information signal 330 unique to each franchise.

[0208] Using the unique cable franchise control information signals 328 and the menu configuration 324 information, the CAP 260 generates the program control information signal 276, as shown at function block 326. The program control information that is unique to a particular cable franchise may be identified in various ways such as with a header. With the header identification, the cable head end 208 may extract the portions of the program control information signal 276 it needs. Now, the CAP 260 may complete its process by electronically packaging the programs into groupings 280 for the signal transmission and adding the program control information 276 to the packaged programs 334 to form a single signal for transmission. Through manual entries by the packager (PDEI 400) or by comparing against a list of programs, the CAP 260 will determine whether the programs are arriving from external sources 280 or sources internal 286 to the Operations Center 202.

[0209] Referring back to Figure 11, upon completion of the CAP's functions, the Operations Center 202, or the uplink site 204 (Figure 1), compresses 288 (if necessary), multiplexes 290, modulates 292 and amplifies 294 the signal for satellite transmission 296. In a basic embodiment, the CAP 260 will also allow entry of time slots for local avails where no national programming will occur.

[0210] Figure 13 is a more detailed flow chart 340 of some of the functions performed by the CAP 260 after an initial program schedule has been entered and menu configurations generated. This flow chart highlights that some of the

functions described earlier in reference to Figures 8, 9, 11 and 12 can be performed in parallel. The flow chart 340 shows six basic functions that are performed by the CAP 260: (1) editing program schedule for local availability 342 (only for non-standard services, i.e., those services that are not national cable services); (2) generating program control information signals 344; (3) processing external programs 346; (4) processing internal programs 348; (5) processing live feeds 350; and, (6) packaging of program information 352. In an alternate embodiment, the CAP 260 is capable of incorporating local programs and accommodating local availability for local television stations.

[0211] Following completion of the programming scheduling (accounting for local availability if necessary) and menu generation 342, the CAP 260 may perform three tasks simultaneously, generating program information signals 344, processing external programs 346 and processing internal programs 348.

[0212] The CAP 260 automatically identifies external programs feeds 356 and identifies which external feed to request the external program 358. The CAP 260 gathers and receives the external programming information 280, 282 (Figure 11) and converts it to a standard digital format 360 for use. The CAP 260 also identifies internal programs 362 (and defined program services), accesses the internal programs 364 (and program services), and converts them to a standard digital format 366, if necessary. In addition, the CAP 260 identifies live signal feeds 368 that will be necessary to complete the packaged programming signal 370. In its last task depicted in Figure 13 the CAP 260 completes the packaging of the programs and combines the packaged program signal with the program control information signal 352, amplifies the signal 354 and sends it out for further processing prior to uplink.

F. Allocation of Cable System Bandwidth

[0213] One of the primary tasks of the Operations Center 202 is, with assistance from the cable head ends 208, effective utilization of available bandwidth from the Operations Center 202 to the subscriber homes. Figure 14 shows effective allocation of 750 mHz of bandwidth (1 mHz to 750 mHz) for television programming. In Figure 14, bandwidth is allocated for both analog 226 and digitally compressed 227 signals. In the preferred embodiment, the bandwidth is divided so that each category of programs receives a portion of the bandwidth. These categories correspond with major menus of the set top terminal software. The representative categories shown in Figure 14 include: (1) high definition TV (HDTV) made possible through the use of compression technology, (2) A La Carte Channel category which provides specialty channels for subscription periods such as monthly, and (3) pay-per-view.

[0214] Figure 15 shows a chart 228 of compressed channel allocation for a variety of programming categories 229 that have been found to be desirable to subscribers. By grouping similar shows or a series of shows into blocks of channels 230, the system 200 is able to more conveniently display similar programming with on-screen television menus. For example, in the movie category, which has the greatest allocation of channels, the same movie may be shown continuously and simultaneously on different channels. Each channel starts the movie at a different time allowing the subscriber to choose a more suitable movie starting time (e.g., every 15 minutes).

[0215] In order to accommodate cable TV systems that have different bandwidths and channel capacities, the television programming and television program control information may be divided into parts such as priority one, two and three. The large bandwidth cable TV systems can accommodate all the parts of the television programming and all parts of the television programming control information. Those cable TV systems with a more limited bandwidth are able to use the program delivery system 200 by only accepting the number of parts that the cable system can handle within its bandwidth.

[0216] For instance, as is shown in Figure 16, three cable television systems with different bandwidths may use the program delivery system 200 simultaneously with each system accepting only those parts of the information sent which it is capable of handling. Priority one television programming and menus 240 are accepted by all three systems. Priority two television programming and menus 242 are not accepted by the cable television system whose capacity is the smallest or in this case 330 mHz (40 channels) system. Priority two television programming and menus 242 are accepted and used by the two larger capacity cable television systems shown. Priority three television programming and menus 244 are only used by the largest capacity television system which is capable of handling all three parts -- Priority one, two and three programming and menu information.

[0217] With this division of television programming and menus, the program delivery system 200 may be utilized simultaneously by a variety of concatenated cable systems 210 (depicted in Figure 1) with varying system capacities. By placing the heavily watched or more profitable programming and menus in the priority one division 240, both users and owners of the cable TV systems will be accommodated as best as possible within the limited bandwidth.

[0218] Figure 17 shows three different cable head end 208 systems, each system receiving the entire satellite signal from the Operations Center 202 and stripping those parts of the signal which cannot be handled by the local cable system due to bandwidth limitations. In this particular embodiment, the three local cable television systems shown have bandwidth limitations which correspond with the bandwidth limitations depicted in the previous Figure 16. As the bandwidth decreases, the programming options available to the viewer in the exemplary on-screen menu decreases. Using this preferred embodiment, the Operations Center 202 is able to send one identical signal to the satellite 206

that is sent to all the cable headends 208. Each cable headend 208 accepts the entire signal and customizes the signal for the local cable system by stripping those portions of the Operations Center signal that are unable to be handled by the local cable system. An alternate embodiment (not shown) requires the Operations Center 202 (and uplink sites 204) to send different signals for reception by different capacity cable headends 208.

[0219] There are several ways in which a cable head end 208 may strip the unnecessary signal from the Operations Center 202. A person skilled in the art will derive many methods from the three examples discussed below. The first method is for the signal originating from the Operations Center 202 (and uplink site 204) to be sent in portions with each portion having a separate header. The respective cable headend 208 would then recognize the headers and transmit to the concatenated cable system 210 only those signals in which the proper headers are identified. For example, using three concatenated cable systems shown in Figure 17, the headers may be "001," "002," and "003." A wide bandwidth concatenated cable system can accept program signals with all three headers, while the narrowest bandwidth concatenated cable system may only be able to accept signals with a "001" header. For this first method, a central Operations Center 202 must divide the program signal into three parts and send a separate leading header before each signal for each part. This method requires has the additional signal overhead of a header on the program signal. The header would be transmitted from time to time as necessary.

[0220] A second method requires a set of transponders to be assigned to each priority level and the cable headend 208 to route signals from the transponders corresponding to the proper priority level for the concatenated cable system 210. For example, if there are three priority levels and eighteen transponders, transponders one through nine may be assigned to priority level one, transponders ten through fourteen priority level two, and transponders fifteen through eighteen assigned to priority level three. Thus, a concatenated cable 210 capable of operating only at priority level two, would only receive signals from transponders one through nine, and ten through fourteen from the respective cable headend 208. The program signal from transponders fifteen through eighteen would not be transmitted to the priority level two concatenated cable system. This method requires the Operations Center 202 to properly assign programs to transponders by priority level. This can be accomplished by the CAP using the software described earlier (e.g., Figure 8 at 438 and 440).

[0221] The third and the preferred method is for the cable headend 208 to pick and choose programming from each transponder and create a customized priority one, two, and three signal with chosen television programming. The cable headend 208 would then route the appropriate customized signal to each part of the concatenated cable system 210 that the cable headend 208 serves. This third method requires that the cable headend 208 have a component, such as the combiner (described in greater detail in EP-A-0 673 578 entitled Digital Cable Headend For A Cable Television Delivery System, (owned by the assignee of the present application) which can select among programs prior to combining the signal for further transmission on a concatenated cable system 210. The third method requires the least coordination between Operations Center 202 and the cable head end 208.

[0222] In addition to dividing the television programming and menus into parts, the Operations Center 202 of the preferred embodiment is also capable of dynamically changing the bandwidth allocation for a particular category of programming. Figure 18 depicts this dynamic change in bandwidth allocation from a typical week day prime time signal 250 to a Saturday afternoon in October signal 252 (during the college football season). Figure 18 highlights the fact that the bandwidth allocated to sports is limited to eight selections 251 during week day prime time 250 but is increased to sixteen selections 253 during a Saturday afternoon in October 252. This dynamic increase in bandwidth allocation allows the system to accommodate changes in programming occurring on an hourly, daily, weekly, monthly, seasonal and annual basis.

[0223] In addition to dynamically allocating bandwidth for programming categories, the Operations Center 202 can also dynamically change the menu capacities in order to accommodate the change in programming and bandwidth. For example, on a Saturday afternoon in October 252, the major menu for sports may include a separate subcategory for college football. This subcategory would, in turn, have a separate submenu with a listing of four, six, eight, or more college football games available for viewing. In order to accommodate this dynamic menu change, the Operations Center 202 must add a submenu listing to the major sports menu, create a new or temporary submenu for college football, and allocate the necessary menu space on the college football submenu.

[0224] Once the television programs have been packaged and a program control information signal is generated to describe the various categories and programs available, the packaged programs are then digitized, compressed, and combined with the program control information signal. Upon the signal's departure from the Operations Center 202 the breakdown into categories is insignificant and the signal is treated like any other digitally compressed signal

G. Compressing and Transmitting Program Signals

[0225] After packaging, the packaged television program signal is prepared for satellite transmission and sent from the Operations Center 202 to the cable headend 208 via satellite 206. Depending on the specific embodiment, the television program signal may need to be compressed, combined/multiplexed, encoded, mapped, modulated, upcon-

verted and amplified. This system, which is intended to be compatible with existing C and Ku Band satellite transmission technologies, accepts video, audio and data signals ranging in signal quality, and input from a number of sources.

[0226] As shown in Figure 3, in the preferred embodiment, the packaged program signal will be treated at a master control uplink site 211 prior to being transmitted to the satellite 206. Following compression the channels must be multiplexed for each transponder carrier and sent to the satellite 206 dish that will provide the uplink. A variety of multiplexing schemes may be used in the system. In some situations, it may be advantageous to use different multiplexing schemes in different parts of the overall system. In other words, one multiplexing scheme may be used for satellite transmission 206 and a second remultiplexing scheme for the land transmission. Various satellite multiaccessing schemes and architectures can be used with the system, including both single channel per carrier (SCPC) frequency division multiplex (FDM) and multiple channel per carrier (MCPC) time division multiplexing (TDM). Time division multiplexing is the more desirable scheme. Once the signal has arrived at the uplink or master control site 211, it must be modulated, upconverted, and amplified. Various types of satellites and transponders capable of handling digital signals may be used in this cable television packaging and delivery system. One of the achievements of the present invention is effective utilization of digital compression technology by packaging television programs into categories that allow easy access to television programs by consumers. With current digital compression techniques for video, the typical 50-channel capacity cable satellite receiving system can be increased to 300 channels.

[0227] Presently, one transponder is used for each satellite delivered channel. The preferred embodiment uses 18 satellite transponders and compression ratios of 4:1 to 8:1 to achieve a capacity of 136 satellite delivered channels. More transponders or higher compression ratios can be used to deliver up to the channel capacity of any existing cable system.

[0228] An example of a satellite that may be used is the AT&T Telstar 303. The signal is transmitted from the satellite 206 to the cable headend 208 where a computer system including a digital switch treats the signal and delivers it through cables to a subscriber's home. In alternate embodiments, multiple Operations Center 202 and multiple uplink sites 211 can be simultaneously utilized.

H. Cable System Use of Control Signal

[0229] Figures 19 through 21 depict sample menu screens produced by the set top terminal 220 using the program control information signal 276. Figure 19 shows a menu which enables the viewer to select a program category or program service from among a choice of eight program categories. Figure 20 shows a menu for the viewer to select a hit movie from among ten hit movies. Figure 21 provides information about a movie (or event) and enables a viewer to order the movie for viewing.

[0230] Figure 19 through 21 show text generation by the set top terminal 220. This text is generated using information received via the program control information signal. Figure 20 shows the text 380 generated for the hit movies major menu. In the preferred embodiment, text 380 such as that shown in Figures 19 through 21 is generated separately by a text generator (not shown) in the set top terminal unit 220. Those portions of the text that generally remain unchanged for a period of weeks or months may be stored in EEPROM or other local storage. For example, the text "HIT MOVIES from" 382 will consistently appear on each hit movies' major menu. This text may be stored on EEPROM or other local storage. Further, text such as that which appears at the lower center part of the screen "PRESS HERE TO RETURN TO CABLE TV" 384 appears many times throughout the menu sequence. This text may also be stored locally at the set top terminal 220. Text which changes on a regular basis, such as the movie titles (or other program selections), will be transmitted to the set top terminal 220 by either the operations center 202 or the cable headend 208. In this manner, the cable headend 208 may change the program selections available on any major menu modifying the program control information signal sent by the operations center 202 and transmitting the change. The network controller 214 of the cable headend 208 generally modifies the program control information signal and transmits the set top terminal control information signal (STTCIS). It is preferred that the text 380 is generated by the set top terminal 220 separately from the graphics because the text can be stored locally in a more compact manner requiring less storage space at the set top terminal 220. In addition, it allows for easy communication of text changes from the operations center 202 or cable headend 208 to the set top terminal 220.

[0231] Figures 19 through 21 show the use of day, date and time 386 information on menus. This information may be obtained in a variety of ways. The day, date, and time information 386 may be sent from the operations center 202, the cable headend 208 (signal processor or network controller 214), the uplink site, or generated by the set top terminal unit 220 internally. Each manner of generating the day, date, and time information 386 has advantages and disadvantages which may change given the particular embodiment and costs. In the preferred embodiment, the day, date, and time 386 are generated at a central location such as the operations center 202 and are adjusted for regional changes in time at the cable headend 208.

[0232] In order for the set top terminal 220 to generate submenus for subcategories of categories shown in Figure 19 (which relate to the content of the programs), and to generate menus for movies such as Figure 21, the terminal

must receive information on the content of the programs from the Operations Center 202 (via the cable headend 208). Normally the set top terminal 220 would receive this information in the form of the program control information signal (or STTCIS). As shown figure 21, in addition to the text needed for these program menus, video or program scenes are also necessary.

[0233] Live video signals may be used in windows of certain menus such as Figure 21. These video signals can be sent via the program control information signal, STTCIS, or can be taken off channels being transmitted simultaneously with the menu display. If the video signal is taken off a channel, less information needs to be sent via the program control information signal. However, this technique requires that separate decompression hardware be used for the program control information and the channel carrying the video. Separate decompressors for the video signals and program information signal allows for the greatest flexibility in the system and is therefore the preferred embodiment. A separate decompressor also assists in assuring that the switch from menus to television programming is smooth and without any significant time delay.

[0234] Live video for menus, promos or demos may be sent to the set top terminal 220 in several ways: a) on a dedicated channel, b) on a regular program channel and scaled to size, c) sent along with the program control information signal, etc. However, in the preferred embodiment, a great deal of short promos or demo video are sent using a split screen technique on a dedicated channel.

[0235] Using a split screen technique, any number of different video clips may be sent (e.g., 2, 4, 6, or 8 video clips). To show the video clip on a menu, the video must either be scaled and redirected to a video window on a menu screen or a masking methodology can be used. Masking involves playing the entire channel of video (all 2, 4, 6, or 8 split screens) in background and masking the unwanted video clip portions of the split screen by playing the menu in foreground and overlaying the unwanted background video. Masking is the least expensive method because it does not require any special hardware and it increases video throughput to the set top terminal 220. However, using the masking technique without any video redirecting causes each video clip to be located in a different position on the screen. It also requires the masking to be different for each video clip and makes consistent format difficult. On the other hand, scaling and redirecting video is generally difficult, expensive and requires additional hardware.

[0236] In order for the Operations Center 202 to prepare the promo video signal to be sent to the set top terminal 220, the Operations Center 202 must first identify the duration and actual video cut to be used for each promo and its position within the promo video signal. This information is maintained within the Operations Center 202 database. When it is time to produce the promo video signal (either to tape or to broadcast), each promo cut is scaled, positioned and combined with the other promos to form the single promo video signal. This is performed by readily available commercial equipment. Each promo is run repeatedly while the promo video signal is being generated. The audio signals of the individual promo cuts may be combined into the promo video signal audio tracks based upon the number of audio tracks available. The mapping of the audio tracks to the promos is also stored in the Operations Center database. Additionally, the mapping of promos to the programs that they are previewing is also stored in the Operations Center database. All promo database data is made available to the set top terminal 220 through the STTCIS.

[0237] In the preferred embodiment, the Operations Center 202 transmits six video/graphic promos for advertising purposes all on one channel. The throughput of the video/graphics on a single channel can be increased through the use of digital compression techniques. The set top terminal 220 uses either video scaling and redirecting techniques or masking to utilize the six video scenes. Although the set top terminal 220 actually performs the manipulation of video as necessary to generate the "live" menus for the subscriber, the appropriately prepared video signals must be formed and sent by the Operations Center 202 to the set top terminal 220.

[0238] If a promo for a given program is available at the set top terminal 220, the viewer may command the set top terminal 220 to display the promo. Generally, this is done through program selection from a menu screen by the subscriber. The selected program is referenced to information about available promos and allows the set top terminal 220 to tune to the proper channel, select the appropriate menu overlay mask based on the promos position and switch on the audio track(s) if they are available. The promos position on the screen dictates the displaying of the "live" text (refer to the video window of Figure 21). The program associated with the currently selected promo may be purchased from this menu screen. Events, services and slices of time may be purchased from promotional menus.

[0239] Management of promo video signals at the Operations Center 202 is similar to that of other programs except that more information is needed in order to specify the details of the promo video signal. The broadcasting of the promo video signal is identical to the broadcasting of a video program.

[0240] In order to limit the amount of bandwidth needed to transmit the program control information signal, various compression techniques employed for non-video may be used such as block coding, contour coding, blob encoding, and run-length encoding. Further, the program control information signal may be divided into text and graphics, or video, text and graphics and then recombined at the set top terminal 220 using a text generator, graphics decompression, and video decompression as necessary.

[0241] As shown in Figure 2, an analog cable TV system 205 can continue to exist alongside and within the digitally compressed system of the present invention. The digital transmissions do not effect the analog system. In fact, the

analog cable signal may be transmitted simultaneously on the same cable as the digital signal. Cable headends 208 may continue to supply subscribers with local channels in an analog signal format.

[0242] In the preferred embodiment, the Operations Center 202 and uplink 204 (Figure 1) or master control site 211 (Figure 3) are collocated. However, the Operations Center 202 and uplink site 204 may be located in different geographical places. Also, functions and equipment within the Operations Center 202 may be remotely located. For instance, the program storage may be at a different site and the programs may be sent to the CAP 260 via landline.

[0243] Alternate embodiments of the system 200 of the present invention may use multiple Operations Centers described above. In such an embodiment, it is preferred that one Operations Center be designated the Master Operations Center and all other Operations Centers be Slave Operations Centers. The Master Operations Center performs the functions of managing and coordinating the Slave Operations Centers. Depending on the method in which the Slave Operations Centers share functions, the Master Operations Center coordination function may involve synchronization of simultaneous transmissions from multiple Slave Operations Centers. To perform its functions, the Master Operations Center may include a system clock for synchronization.

[0244] An efficient method of dividing tasks among multiple Operations Centers is to assign specific satellite transponders to each Operations Center 202 and to assign external program sources to the nearest Operations Center 202. Of course, this division of resources may not always be possible. Since programming will be grouped into priority levels with each priority level likely to be assigned specific satellite transponders, it is also possible to assign each Operations Center 202 to a priority level. For example, in a three priority level system with two Slave Operations Centers A and B and 18 transponders, the Master Operations Center may be assigned priority level 1 and assigned 9 transponders. Slave Operations Center A may be assigned priority level 2 and 5 transponders, while Slave Operations Center B is assigned priority level 3 and 4 transponders. In a multiple Operations Center configuration dynamic bandwidth allocation and dynamic menu capacity allocation becomes more complex and will be coordinated by the Master Operations Center.

[0245] Just as in the alternate embodiment wherein multiple Operations Centers 202 are used, a delivery system may have multiple satellite uplinks. Preferably, each Operations Center 202 has one or more uplink sites. Each Operations Center 202 controls the functions of its assigned uplink sites and may assign one site as a master uplink site.

[0246] In another alternative configuration, in regions or areas without cable services, where subscribers might use backyard satellite systems (TV RO) to receive packaged television services, the set top terminal 220 will include the appropriate hardware to allow connection to the backyard satellite reception equipment, i.e., a typical communication port. In this configuration, the backyard satellite system will receive programming signals originating from the Operations Center 202 directly from the satellite transponders. No cable headend 208 is utilized with a backyard satellite system. The menu system within the set top terminal 220 will be programmed directly from the Operations Center 202. The Operations Center program signals and control signals arrive at the set top terminal 220 essentially unchanged. Additionally, in this configuration, an upstream communication mechanism must be in place at the subscriber's home (e.g., modem) to communicate information to the Operations Center 202 such as program ordering information. The set top terminals 220 can be equipped with a modem port for this upstream communication to the Operations Center 202. The two alternative embodiments described in the preceding four paragraphs, and other such embodiments not specifically referred to herein but within the understanding of those skilled in the art, incorporate or combine one or more of the components of the system 200 of the present invention.

Claims

1. An apparatus for a television program delivery system characterized by:

receiving means (272) for receiving television programs in analog or digital format, each having video and audio components, wherein the receiving means (272) includes at least one reception port;
 coordinating means, connected to the receiving means (272), for coordinating the receipt of the television programs;
 input means (262) for receiving input commands and specific information about each of the television programs;
 database means (268), including a central processing unit (264), connected to the input means (262), for storing and supplying information about the television programs;
 generation means (264), connected to the input means (262) and database means (268), for generating a program control information signal (276) based on the input from the input means (262) and the database means (268), the signal (276) containing specific identification about each television program in a subset of television programs received by the receiving means (272), including the date and time of display and the category into which the television program falls;

combining means (270), connected to the generation means (264) and receiving means (272), for combining the subset of television programs identified in the program control information signal (276) in preparation for transmission;

5 multiplexing means (290), including a multiplexer, connected to the combining means (270), for multiplexing the combined television programs and program control information signal (276) for transmission; and transmitting means (292, 294, 296), including a modulator, connected to the multiplexing means (290), for simultaneously transmitting the multiplexed program control information signal (276) along with the multiplexed television programs so that video displays can be generated from the program control information signal and so that the downstream displays of the television programs can be selected and controlled by the viewers.

10 2. The apparatus of claim 1 further characterized by a conversion means (284), connected to the receiving means (272), for digitizing the television programs received in analog format.

15 3. The apparatus of claim 1 wherein the database means (268) further includes means for storing and for supplying information about the viewers.

20 4. The apparatus of claim 1 wherein the generation means (264) includes means for designating a set of television programs whose identities will be included in the program control information signal (276) so that the subset of television programs corresponds to one or more television program line-ups.

5 5. The apparatus of claim 1 wherein the input means (262) includes a local sensor and receptor which responds to voice, touch sensitive entries or input keys.

25 6. The apparatus of claim 1 wherein at least one of the television programs includes a television program which is continuously and repeatedly transmitted and wherein the program control information signal (276) continuously transmits the next incremental start time.

30 7. The apparatus of claim 1 wherein the central processing unit (264) combines and analyzes information from the database means and input entered from the input means (262) to generate the digital program control information signal (276).

35 8. The apparatus of claim 1 wherein the apparatus is further characterized by internal video storage (267) of television programs in analog or digital format and means for acquiring external feeds of television programming, both of which are accessible by and connected to the receiving means (272) whereby either internally stored programming or externally obtained programming can be converted by the conversion means (284), combined by the combining means (270) and transmitted by the transmitting means (292, 294, 296) along with a related program control information signal (276).

40 9. The apparatus of claim 1 wherein the central processor unit (264) includes processing means for controlling the content of the program control information signal combined with software operating the processing means based on commands entered into input means (262), the combined processing means and software characterized by:

means (262, 264) for creating program lineups for transmission to viewers;

45 means (264, 268), connected to the creating means (262, 264) for prioritizing programs based on a plurality of factors including popularity of the program, its weighted importance and the bandwidth available to the viewer to receive the plurality of programs;

means (262), connected to the prioritizing means, for initiating allocation of different menus to different classes of viewers;

50 means (262), connected to the menu means, for initiating bandwidth allocations so that different program content is sent to different viewers; and

editing means (262), connected to the menu means, to design, create and change menus listing the variable content created by the prioritizing means and the allocation means.

55 10. The apparatus of claim 1 wherein the program control data information signal includes a category designation for each television program, each category designation selected from the group consisting of static programming, interactive services, pay for view, live sport specials, mini pays or data services

11. The apparatus of claim 1 wherein the transmitting means (292, 294, 296) includes means for transmitting the signal

to a plurality of selectable satellite transponders and wherein the the apparatus is further characterized by means for grouping television programs into separate groups for transmission over selected transponders.

5 12. The apparatus of claim 1 wherein the transmitting means (292, 294, 296) includes means for transmitting the signal to a plurality of selectable satellites and the apparatus is further characterized by means for grouping television programs into separate groups for transmission to different geographical regions.

10 13. The apparatus as claimed in claim 1 wherein the database means (268) includes a plurality of databases and wherein the apparatus is further characterized by processing means for accessing the databases and processing the information therein to provide the requisite program control information signal, the databases including information concerning each scheduled Program, records representing the source from which each television program was obtained, optional display services available, available previews of television programs, program categories for each television program to be transmitted and price categories for each television program to be transmitted.

15 14. The apparatus as claimed in claim 1 wherein the database means (268) includes a plurality of databases, each database composed of multiple related sets of data, and wherein the apparatus is further characterized by processing means for accessing the databases and processing the information therein and management means for determining how to operate the apparatus so that it provides the requisite control information signal, the databases including:

20 means for storing information about each destination to which the apparatus transmits;
means for storing information about rights in or ownership in each program source;
means for storing information about price, promotion and packaging of each program broadcast;
25 means for storing information about the storage location of each internally stored program; and
means for storing information about marketing and customer.

15. The apparatus of claim 1 modified in that:

30 the apparatus is further characterized by an internal collection means, connected to the receiving means (272), for gathering television programs from internal sources and feeding the television programs from internal sources to the reception port;
the generation means (264) and the input means (262) are part of a packaging means for creating program control information and for packaging television programs using the program control information, the packaging means including:

35 the central processing unit (264);
the input means (262) which includes an interface, connected to the central processing unit (264), to enable the program packager to enter program line-up information, wherein the interface is operably connected to the central processing unit (264);
40 a storage means, connected to the central processing unit (264), for storing the entered program line-up information;
logic means (264), connected to the central processing unit (264), for arranging the stored program line-up information and for creating program control information; and
means (264), connected to the logic means (264), for generating a program control information signal
45 (276) from the program control information;

50 the combining means (270) combines the set of television programs identified in the program control information signal (276) with the program control information signal(276) to create a combined signal, wherein the combining means includes a delivery control processor (270);
the multiplexing means (290) multiplexes the combined signal; and
the transmission means (292, 294, 296), transmits the combined signal.

16. The apparatus of claim 15, wherein

55 the packaging means includes means for generating menu configurations (324); and
the packaging means generates the program control information using the menu configurations.

17. The apparatus of claim 15 further characterized by:

means (264) for receiving unique cable franchise control information from cable franchises;
 means (269, 328), connected to the receiving means (264), for storing the unique cable franchise control
 information, the storing means includes the cable franchise configuration database (328); and
 wherein the generating means (264), connected to the storing means (328) comprises means for including
 the unique cable franchise control information signal in the generated program control information signal.

18. A method for delivering television programs in a television program delivery system characterized by the steps of:

(a) receiving (272) a plurality of television programs in analog or digital format, each having video and audio
 components;
 (b) supplying (262) information about the received television programs, including information on the identities
 of the received television programs;
 (c) storing (268) information supplied about the received television programs for use in the steps of delivering
 the received television programs;
 (d) creating (400, 316, 318, 342) a plurality of program line-ups that identify received television programs using
 the stored information about the received television programs;
 (e) generating (326, 442) a program control information signal (276) using one or more of the created program
 line-ups;
 (f) preparing (332, 334) the program control information signal (276) and a plurality of the television programs
 identified in the program control information signal for transmission; and
 (g) transmitting (292, 294, 296) the prepared program control information signal (276) and the prepared tele-
 vision programs for redistribution to subscriber locations, whereby, the prepared and transmitted television
 programs may be viewed by a subscriber.

19. The method of claim 18 wherein the preparing step includes a method of transmitting a plurality of programs to a
 cable headend (208), each of the plurality of programs corresponding to one of a plurality of genre categories, the
 transmitting including the steps of:

prioritizing (400) each of the programs by assigning to each of the programs one of a plurality of priority levels,
 the plurality of priority levels including a high priority level and progressively lower priority levels;
 forming (400) a plurality of signals, each of the signals including programs corresponding to a single priority
 level;
 appending (320) a header to each of the signals, wherein the header identifies the priority level for a corre-
 sponding signal, thereby enabling recognition by the cable headend; and
 transmitting (292, 294, 296) each of the headers and the corresponding signals to the cable headend (208).

20. The method of claim 18, wherein the preparing step includes a method of transmitting programs to a plurality of
 transponders, the method including the steps of:

prioritizing (400) each of the programs by assigning to each of the programs one of a plurality of priority levels,
 the plurality of priority levels including a high priority level and progressively lower priority levels;
 forming (400) a plurality of signals, each of the signals including programs corresponding to a single priority
 level; and
 transmitting (292, 294, 296) the plurality of signals to the plurality of transponders so that none of the trans-
 ponders receives more than one of the signals.

21. The method of claim 20 further including the step of dynamically changing bandwidth allocation for at least one of
 the plurality of categories.

22. The method of claim 18 wherein the preparing step includes a method of transmitting a plurality of programs in a
 first amount of bandwidth for reception by a first cable headend (208), and in a second amount of bandwidth which
 is less than the first amount of bandwidth for a second cable headend (208), the method including the steps of:

prioritizing (400) each of the programs by assigning to each of the programs one of a plurality of priority levels,
 the plurality of priority levels including a high priority level and progressively lower priority levels;
 dividing (320) the first amount of bandwidth so that each program category receives a portion of the first amount
 of bandwidth;
 forming (320) a first allocation of bandwidth by allocating the first amount of bandwidth to high priority programs

in each category;
continuing the forming (400) a first allocation step with the progressively lower priority levels until at least one of the following conditions occurs:

- 5 all programs are allocated;
- all of the first amount of bandwidth is allocated;

dividing the second amount of bandwidth so that each program category receives a portion of the second amount of bandwidth;

- 10 forming (320) a second allocation of bandwidth by allocating the second amount of bandwidth to high priority programs in each category;
- continuing the forming a second allocation step with the progressively lower priority levels until at least one of the following conditions occurs:

- 15 all programs are allocated;
- all of the second amount of bandwidth is allocated;

transmitting the first allocation of bandwidth to the first cable headend (208); and
transmitting the second allocation of bandwidth to the second cable headend (208).

- 20 23. The method of claim 18 wherein the step of generating a program control information signal (276) for use by viewers using menus of available programming based on program line-up information includes the steps of:

- 25 obtaining and storing (400) program line-up information for each program, the program line-up information comprising, program name, program start time, program duration, program category and program price;
- arranging (432) the program line-up information for all programs in a menu configuration;
- creating (430) program control information using the program line-up information;
- generating (442) a digital program control information data signal using the program control information; and
- 30 continuously transmitting (292, 294, 296) the digital program control information data signal simultaneously with the programs.

- 24. The method of claim 18 wherein the step of generating a program control information signal includes generating a program control information signal for transmission to viewers of a simultaneously transmitted plurality of television programs so that variable video displays of current and future programming can be generated and so that the downstream displays of the television programs can be selected and controlled by the viewers, the method including:

- 35 receiving (400) as input data entry, program names, start times (412), program duration and program category (302, 304, 306, 308, 310, 312) and price (414);
- 40 combining (402) the input data with stored marketing data (420, 422) including the frequency with which programs are watched by viewers and the demographics of viewers;
- weighing (424) the data according to algorithms which assign a weight of importance to each type of data;
- generating (430, 432) from the data a program line-up, and program position on menu formats;
- 45 displaying (434) the resulting draft menu for editing;
- editing (436, 400) the menu; and
- processing (438) the edited menu to generate (442) the program control information signal for transmission to viewers.

- 25. The method of claim 24 wherein digital program control information signal is transmitted to cable franchises and wherein the method further includes:

- 50 means (404) for receiving specific information relating to each cable franchise that receives the signal; and
- means (404) for creating a customized signal (428) for each cable franchise.

- 55 26. The method of claim 24 wherein the program control information signal also contains information for identifying virtual channels for interactive services (304) and data services (312) available to viewers using service information (503), the method further including the steps of:

collecting service information (503) on the data services (312) available;
 inventorying the interactive services (304) to be made available to the viewer;
 assigning a virtual channel for the data services (312) and the interactive services (304);
 determining method of upstream transmissions for interactive services (304); and
 creating a menu for interactive services (304) and data services (312) for later processing.

27. The method of claim 18 wherein the step of creating a program line-up includes a method to assist a program packager to create a transmissible data information signal which organizes stored information on television programs available for viewing into program line-ups and generates (442) a program control information signal (276) from the program line-ups to enable selection of television programs for viewing by viewers, the method including the steps of:

receiving (400) information on television programs available for viewing;
 organizing (430) the information on television programs available for viewing into program line-up information using stored computer instructions including a set of computer instructions for utilizing the stored data to optimize the selection of television programs to be watched by each viewer;
 editing (436) the program line-up information;
 generating (442) the program control information signal (276) using the program line-up information; and
 transmitting (292, 294, 296) the program control information signal (276) as a digital data signal so that the television programs from which a viewer can choose will be displayed for selection by a viewer.

28. The method of claim 27 further including the steps of gathering of program watched information from viewers, and wherein the organizing step further includes:

targeting (402) a television program; and
 managing (402) the yield of the programs watched information for the targeted program so that the targeted program yields higher programs watched information.

29. The method of claim 27 wherein at least one of the television programs is a program service including a time limited series of programming offered for a defined time each day for a limited number of calendar days and wherein the program control information signal (276) includes information providing an identification and description of the service, the starting and stopping dates and the times each day that the service can be viewed by the viewers.

30. The method of claim 18 wherein the step of creating a program line-up includes a method to create program services containing at least one program and an interstitial audio/video for transmission, the method, including the following steps:

obtaining (461) one or more programs and interstitial audio/video;

creating (460) events including:

combining (462) one or more programs with one or more interstitial audio/video so that an event is longer than the one or more combined programs; and
 creating (464) an event identification for recalling the event;

generating program services including:

integrating one or more events using the event identification so that there are no disruptions to the programs or interstitial audio/video;

determining (318) calendar days that the program service will be transmitted;
 defining (400) time of day that the program service will be transmitted; and

transmitting (292, 294, 296) the program service containing the integrated events on the determined calendar days at the defined time.

31. The method of claim 30 wherein program services are paid for by viewers, the method further including the steps of:

creating a mini-pay consisting of one or more program services; and

assigning a price to the mini-pay.

- 5 **32.** The method of claim 18 characterized in that the step of creating a program line-up includes a method for creating near video on demand service using programs wherein the near video on demand service is transmitted from a central location for distribution to subscribers, including:

designating (400) a program to be available to subscribers more than once during a day;
evaluating (400) the length of the designated program;
creating (400) program start times using the evaluated length of the program;
10 organizing (430) a program line-up with the designated program and the program start times so that the program appears in the program line-up more than once and wherein more than one designated programs is in the program line-up; and
wherein the step of generating (442) a program control information signal (276) uses the organized program line-ups.

- 15 **33.** The method of claim 32 wherein programs may be demanded within fifteen minutes, the step of creating program start times includes:

dividing the evaluated program length into multiple fifteen minutes segments and one last segment; and
20 identifying interstitial audio/video to be added to the last segment.

- 34.** The method of claim 32 wherein a monitor is used, the method further characterized by:

graphically (438) reorganizing the program line up using a monitor before generating the program control
25 information signal.

- 35.** The method of claim 18 characterized in that the step of creating a program line-up includes a method for creating near video on demand service using programs wherein the near video on demand service is transmitted from a
30 central location for distribution to subscribers, including:

designating (400) a program to be available to subscribers more than once;
evaluating (400) the length of the designated program;
creating (400) program start times using the evaluated length of the program;
organizing (430) a program line-up using the program start times (412) so that the program appears in the
35 program line-up more than once;
generating (434) a program control information signal using the organized program line-up; and
transmitting (292, 294, 296) the program control information signal (276) and the designated program to subscribers, wherein the designated program is transmitted to subscribers at the designated program's start times
(412).

- 40 **36.** The method of claim 18 further including method for compiling and using program watched data (420) containing information on programs wherein program watched data is received from one or more remote locations, the method further characterized by the steps of:

receiving (402) program watched data;
designating (402) a program for analysis;
compiling (402) the received program watched data (420) for the designated program; and
45 using the compiled program watched data (420) in the formation of a program line-up including:

determining (430) whether the compiled data is favorable for placing the designated program in a particular
50 time slot; and
allotting (430) a time slot for the designated program in the program line up.

- 55 **37.** The method of claim 35 wherein menus having menu space are filled using the program watched data, further characterized by the step of:

allocating menu space for the designated program using the program line-up.

38. The method of claim 18 wherein the packaging step includes a method for allocating a given amount of bandwidth for a plurality of television programs from the programs received by the receiving means (272), each of the programs corresponding to one of a plurality of genre categories, the allocation method including the steps of:

prioritizing (400) each of the programs by assigning to each of the programs one of a plurality of priority levels, the plurality of priority levels including a high priority level and progressively lower priority levels, whereby programs having a higher priority level will be accepted by systems having a limited bandwidth; dividing the given amount of bandwidth so that each program category receives a portion of the given amount of bandwidth;

allocating (326) the given amount of bandwidth to high priority programs in each category; and continuing the allocating step with the progressively lower priority levels until at least one of the following conditions occurs:

all programs are allocated,
all of the given amount of bandwidth is allocated.

Patentansprüche

1. Vorrichtung für ein Fernsehprogramm-Versorgungssystem, **gekennzeichnet durch**

eine Empfangseinrichtung (272) zum Empfangen von Fernsehprogrammen in analogem oder digitalem Format, jeweils mit Video- und Audio-Bestandteilen, wobei die Empfangseinrichtung (272) wenigstens einen Empfangsanschluß aufweist;

eine mit der Empfangseinrichtung (272) verbundene Abstimmereinrichtung zum Abstimmen des Empfangs der Fernsehprogramme;

eine Eingabeeinrichtung (262) zum Empfangen von Eingabebefehlen und spezifischer Information über jedes der Fernsehprogramme;

eine Datenbankeinrichtung (268) mit einer mit der Eingabeeinrichtung (262) verbundenen Zentralverarbeitungseinheit (264) zum Speichern und Liefern von Information über die Fernsehprogramme;

eine mit der Eingabeeinrichtung (262) und der Datenbankeinrichtung (268) verbundene Erzeugereinrichtung (264) zum Erzeugen eines Programmsteuer-Informationssignals (276) auf der Grundlage der Eingabe aus der Eingabeeinrichtung (262) und der Datenbankeinrichtung (268), wobei das Signal (276) eine spezifische Kennung für jedes Fernsehprogramm in einer Teilmenge von Fernsehprogrammen, die von der Empfangseinrichtung (272) empfangen werden, aufweist, wobei die Kennung das Datum und die Zeit zur Wiedergabe und die Kategorie, in die das Fernsehprogramm fällt, enthält;

eine mit der Erzeugereinrichtung (264) und der Empfangseinrichtung (272) verbundene Kombiniereinrichtung (270) zum Kombinieren der Untermenge von Fernsehprogrammen, die im Programmsteuer-Informationssignal (276) ausgewiesen sind, in Vorbereitung für die Übertragung;

eine mit der Kombiniereinrichtung (270) verbundene Multiplexereinrichtung (290) zum Multiplexen der kombinierten Fernsehprogramme und des Programmsteuer-Informationssignals (276) zur Übertragung; und

eine mit der Multiplexereinrichtung (290) verbundene Übertragungseinrichtung (292, 294, 296) mit einem Modulator zum gleichzeitigen Übertragen des gemultiplexten Programmsteuer-Informationssignals (276) zusammen mit den gemultiplexten Fernsehprogrammen, so daß Videodarstellungen aus dem Programmsteuer-Informationssignal erzeugt werden können, und so daß die Downstream-Darstellungen der Fernsehprogramme von den Betrachtern ausgewählt und gesteuert werden können.

2. Vorrichtung gemäß Anspruch 1, weiter gekennzeichnet durch eine mit der Empfangseinrichtung (272) verbundene Umwandlungseinrichtung (284) zum Digitalisieren von im analogen Format empfangenen Fernsehprogrammen.

3. Vorrichtung gemäß Anspruch 1, wobei die Datenbankeinrichtung (268) weiter eine Einrichtung zum Speichern und Liefern von Information über die Betrachter enthält.

4. Vorrichtung gemäß Anspruch 1, wobei die Erzeugereinrichtung (264) eine Einrichtung zum Bestimmen einer Menge von Fernsehprogrammen, deren Kennungen im Programmsteuer-Informationssignal (276) enthalten sein werden, aufweist, so daß die Untermenge von Fernsehprogrammen einer oder mehrerer Fernsehprogrammaufstellungen entspricht.

5. Vorrichtung gemäß Anspruch 1, wobei die Eingabeeinrichtung (262) einen lokalen Sensor und Aufnehmer, der auf Stimme, berührungssensitive Eingaben und Eingabeschlüssel reagiert, enthält.
- 5 6. Vorrichtung gemäß Anspruch 1, wobei wenigstens eines der Fernsehprogramme ein Fernsehprogramm enthält, das fortlaufend und wiederholt übertragen wird, und wobei das Programmsteuer-Informationssignal (276) fortlaufend die nächste Inkrement-Startzeit überträgt.
7. Vorrichtung gemäß Anspruch 1, wobei die Zentralverarbeitungseinheit (264) Information aus der Datenbankeinrichtung und von der Eingabeeinrichtung (262) eingegebene Eingabe kombiniert und analysiert, um das digitale
10 Programmsteuer-Informationssignal (276) zu erzeugen.
8. Vorrichtung gemäß Anspruch 1, gekennzeichnet durch einen internen Videospeicher (267) für Fernsehprogramme in analogem oder digitalem Format und eine Einrichtung zum Einspeisen externer Fernsehprogrammierung, auf die jeweils durch die Empfangseinrichtung (272) zugegriffen werden kann und die mit der Empfangseinrichtung
15 verbunden sind, wodurch intern gespeicherte Programmierung oder von extern erlangte Programmierung durch die Umwandlungseinrichtung (284) umgewandelt, durch die Kombinationseinrichtung (270) kombiniert und durch die Übertragungseinrichtung (292, 294, 296) gemeinsam mit dem zugehörigen Programm-Informationssignalsignal (276) übertragen werden kann.
- 20 9. Vorrichtung gemäß Anspruch 1, wobei die Zentralverarbeitungseinheit (264) eine Verarbeitungseinrichtung enthält zum Steuern des Inhalts des Programmsteuer-Informationssignals, das mit Software, die die Verarbeitungseinrichtung betreibt, verbunden ist, aufgrund von in die Eingabeeinrichtung (262) eingegebenen Befehlen, wobei die kombinierte Verarbeitungseinrichtung und die Software gekennzeichnet sind durch
25 eine Einrichtung (262, 264) zum Erzeugen von Programmaufstellungen zum Übertragen zu dem Betrachter; eine mit der Erzeugereinrichtung (262, 264) verbundene Einrichtung (264) zum Vergeben von Prioritäten an Programme auf der Grundlage einer Vielzahl von Faktoren, die die Popularität des Programms, seine gewichtete Bedeutung und die für den Betrachter mögliche Bandbreite, um eine Vielzahl von Programmen zu empfangen, enthält;
30 eine mit der Prioritätsvergabeereinrichtung verbundene Einrichtung (262) zum Starten einer Zuweisung von unterschiedlichen Menüs zu unterschiedlichen Klassen von Betrachtern; eine mit der Menüeinrichtung verbundene Einrichtung (262) zum Starten von Bandbreitenzuweisungen, so daß unterschiedlicher Programminhalt zu unterschiedlichen Betrachtern geschickt wird; und eine mit der Menüeinrichtung verbundene Editiereinrichtung (262) zum Auslegen, Erzeugen und Verändern
35 von Menüs, die veränderbaren Inhalt, der durch die Prioritätsvergabeereinrichtung und die Zuweisungseinrichtung erzeugt wird, auflisten.
10. Vorrichtung gemäß Anspruch 1, wobei das Programmsteuerdateninformationssignal eine Kategoriebestimmung für jedes Fernsehprogramm enthält, wobei die Kategoriebestimmung aus der Gruppe feste Programmierung, interaktive Dienstleistungen, Bezahlprogramme, Live-Sportberichterstattungen, Mini-Pays und Datendienstleistungen ausgewählt wird.
40
11. Vorrichtung gemäß Anspruch 1, wobei die Übertragungseinrichtung (292, 294, 296) eine Einrichtung zum Übertragen des Signals zu einer Vielzahl von auswählbaren Satellitentranspondern enthält und weiter eine Einrichtung zum Gruppieren von Fernsehprogrammen in getrennte Gruppen zum Übertragen zu den ausgewählten Transpondern enthalten ist.
45
12. Vorrichtung gemäß Anspruch 1, wobei die Übertragungseinrichtung (292, 294, 296) eine Einrichtung zum Übertragen des Signals zu einer Vielzahl von auswählbaren Satelliten und weiter eine Einrichtung zum Gruppieren von Fernsehprogrammen in getrennte Gruppen zum Übertragen in unterschiedliche geographische Gebiete enthalten ist.
50
13. Vorrichtung gemäß Anspruch 1, wobei die Datenbankeinrichtung (268) eine Vielzahl von Datenbanken enthält und wobei weiter eine Verarbeitungseinrichtung enthalten ist zum Zugriff auf die Datenbanken und zum Verarbeiten der darin enthaltenen Information, um das notwendige Programmsteuer-Informationssignal zu liefern, wobei die
55 Datenbanken Informationen betreffend jedes planmäßige Programm, Datensätze, die die Quelle wiedergeben, aus der jedes Fernsehprogramm erhalten wird, optional mögliche Darstellungsdienstleistungen, mögliche Fernsehprogramm-Vorschauen, Programmkategorien für jedes zu übertragende Fernsehprogramm und Preiskatego-

rien für jedes zu übertragende Fernsehprogramm enthält.

- 5 14. Vorrichtung gemäß Anspruch 1, wobei die Datenbankeinrichtung (268) eine Vielzahl von Datenbanken enthält, wobei jede Datenbank aus einem im Vielfach-Zusammenhang stehenden Datensatz besteht, und weiter eine Verarbeitungseinrichtung zum Zugriff auf die Datenbanken und zum Verarbeiten der darin enthaltenen Information und eine Führungseinrichtung zum Bestimmen, wie die Vorrichtung zu betreiben ist, so daß das notwendige Steuerinformationssignal geliefert wird, enthalten ist, wobei die Datenbanken

10 eine Einrichtung zum Speichern von Information über jede Bestimmung, zu der die Vorrichtung überträgt;
eine Einrichtung zum Speichern von Information über Rechte in oder Besitzstand auf jede Programmquelle;
eine Einrichtung zum Speichern von Information über Preis, Promotion und Zusammenstellung jeder Programmsendung;
eine Einrichtung zum Speichern von Information über den Speicherbereich jedes intern gespeicherten Programms; und
15 eine Einrichtung zum Speichern von Information über Marketing und Käufer

aufweist.

- 20 15. Vorrichtung gemäß Anspruch 1, dadurch abgeändert, daß die Vorrichtung gekennzeichnet ist durch eine mit der Empfangseinrichtung (272) verbundene interne Sammeleinrichtung zum Sammeln von Fernsehprogrammen aus internen Quellen und zum Einspeisen der Fernsehprogramme aus internen Quellen in den Empfangsanschluß;

25 wobei die Erzeugereinrichtung (264) und die Eingabeeinrichtung (266) Teil einer Paketierungseinrichtung zum Erzeugen von Programmsteuerinformationen und zum Bilden von Fernsehprogramm-Paketen mittels der Programmsteuerinformation, wobei die Paketierungseinrichtung
eine Zentralverarbeitungseinheit (264);
eine mit der Zentralverarbeitungseinheit (264) verbundene Eingabeeinrichtung (262), die eine Schnittstelle aufweist, um dem Programmpaketbilder die Aufnahme von Programmaufstellungsinformation zu ermöglichen, wobei die Schnittstelle für den Betrieb mit der Zentralverarbeitungseinheit (264) verbunden ist;
30 eine mit der Zentralverarbeitungseinheit (264) verbundene Speichereinrichtung zum Speichern der eingegebenen Programmaufstellungsinformation;
eine mit der Zentralverarbeitungseinheit (264) verbundenen Logikeinrichtung (264) zum Anordnen der gespeicherten Programmaufstellungsinformation und zum Erzeugen von Programmsteuerinformation; und
eine mit der Logikeinrichtung (264) verbundenen Einrichtung (264) zum Erzeugen eines Programmsteuer-Informationssignals (276) aus der Programmsteuerinformation aufweist,
35 wobei die Kombiniereinrichtung (270) einen Satz von im Programmsteuer-Informationssignal (276) gekennzeichneten Satz von Fernsehprogrammen mit dem Programmsteuer-Informationssignal (276) kombiniert, um ein kombiniertes Signal zu erzeugen, wobei die Kombiniereinrichtung einen Versorgungssteuerprozessor (270) enthält;
40 wobei die Multiplexereinrichtung (290) das kombinierte Signal multiplext; und
wobei die Übertragungseinrichtung (292, 294, 296) das kombinierte Signal überträgt.

- 45 16. Vorrichtung gemäß Anspruch 15, wobei die Paketierungseinrichtung eine Einrichtung zum Erzeugen von Menükonfigurationen (324) enthält; und

wobei die Paketierungseinrichtung die Programmsteuerinformation mittels der Menükonfigurationen erzeugt.

17. Vorrichtung gemäß Anspruch 15, weiter gekennzeichnet durch

50 eine Einrichtung (264) zum Empfangen einer einzelnen Kabelfranchise-Steuerinformation von Kabelfranchisenehmern;
eine mit der Empfangseinrichtung (264) verbundene Einrichtung (269, 328) zum Speichern des einzelnen Kabelfranchise-Steuersignals, wobei die Speichereinrichtung die Kabelfranchise-Konfigurationsdatenbank (328) enthält; und
55 wobei die mit der Speichereinrichtung (328) verbundene Erzeugereinrichtung (264) eine Einrichtung zum Einfügen des einzelnen Kabelfranchise-Steuerinformationssignals in das erzeugte Programmsteuer-Informationssignal aufweist.

18. Verfahren zum Verteilen von Fernsehprogrammen in einem Fernsehprogrammversorgungssystem, **gekennzeichnet** durch die Verfahrensschritte:

- (a) Empfangen (272) einer Vielzahl von Fernsehprogrammen im analogen oder digitalen Format, wobei jedes Programm Video- und Audio-Bestandteile aufweist;
- (b) Liefern (262) von Information über die empfangenen Fernsehprogramme, wobei die Information Information über Kennungen der empfangenen Fernsehprogramme enthält;
- (c) Speichern (268) von über die empfangenen Fernsehprogramme gelieferte Information zum Verwenden für die Verteilungsschritte der empfangenen Fernsehprogramme;
- (d) Erzeugen (400, 316, 318, 342) einer Vielzahl von Programmaufstellungen, die die empfangenen Fernsehprogramme mittels der gespeicherten Information über die empfangenen Fernsehprogramme kennzeichnen;
- (e) Erzeugen (326, 442) einer Programmsteuer-Informationssignals (276) mittels einer oder mehrerer erzeugter Programmaufstellungen;
- (f) Vorbereiten (332, 334) des Programmsteuer-Informationssignals (276) und einer Vielzahl von von dem Programmsteuer-Informationssignal zur Übertragung gekennzeichneten Fernsehprogrammen; und
- (g) Übertragen (292, 294, 296) des vorbereiteten Programmsteuer-Informationssignals (276) und der vorbereiteten Fernsehprogramme zum Neuverteilen auf die Teilnehmerstellen, wodurch die vorbereiteten und übertragenen Fernsehprogramme durch einen Teilnehmer betrachtet werden können.

19. Verfahren gemäß Anspruch 18, wobei der Vorbereitungsschritt ein Verfahren zum Übertragen einer Vielzahl von Programmen auf eine Kabelempfangsstelle (208) enthält, wobei jedes der Vielzahl von Programmen einer aus einer Vielzahl von Genrekategorien entspricht, wobei das Übertragen die Verfahrensschritte aufweist:

- Vergeben von Prioritäten (400) für jedes der Programme durch Zuweisen einer aus einer Vielzahl von Prioritätsebenen zu jedem der Programme, wobei die Vielzahl von Prioritätsebenen eine hohe Prioritätsebene und stetig abnehmende Prioritätsebenen aufweist;
- Bilden (400) einer Vielzahl von Signalen, wobei jedes der Signale Programme, die zu einer einzelnen Prioritätsebene gehören, enthält;
- Anhängen (320) eines Kopfteils an jedes der Signale, wobei das Kopfteil die Prioritätsebene für ein entsprechendes Signal kennzeichnet, wodurch ein Erkennen durch die Kabel-Empfangsstelle ermöglicht wird; und
- Übertragen (292, 294, 296) von jedem Kopfteil und den entsprechenden Signalen zur Kabel-Empfangsstelle (208).

20. Verfahren gemäß Anspruch 18, wobei der Vorbereitungsschritt ein Verfahren zum Übertragen von Programmen zu einer Vielzahl von Transpondern aufweist, wobei das Verfahren die Schritte umfaßt:

- Vergeben von Prioritäten (400) an jedes der Programme durch Zuweisen einer aus einer Vielzahl von Prioritätsebenen zu jedem der Programme, wobei die Vielzahl von Prioritätsebenen eine hohe Prioritätsebene und stetig abnehmende Prioritätsebenen enthält;
- Bilden (400) einer Vielzahl von Signalen, wobei jedes Signal Programme, die zu einer einzelnen Prioritätsebene gehören, enthält; und
- Übertragen (292, 294, 296) der Vielzahl von Signalen zu der Vielzahl von Transpondern, so daß keiner der Transponder mehr als eines der Signale empfängt.

21. Verfahren gemäß Anspruch 20, weiter umfassend den Schritt eines dynamischen Änderns der Bandbreitenzuweisung zu wenigstens einer der Vielzahl von Kategorien.

22. Verfahren gemäß Anspruch 18, wobei der Vorbereitungsschritt ein Verfahren zum Übertragen einer Vielzahl von Programmen in einer ersten Bandbreitenweite zum Empfang durch eine erste Kabel-Empfangsstelle (208) und in einer zweiten Bandbreitenweite, die kleiner ist als die erste Bandbreitenweite, für eine zweite Kabel-Empfangsstelle (208) aufweist, wobei das Verfahren die Schritte:

- Vergeben von Prioritäten (400) für jedes der Programme durch Zuweisen einer aus einer Vielzahl von Prioritätsebenen zu jedem der Programme, wobei die Vielzahl von Prioritätsebenen eine hohe Prioritätsebene und stetig abnehmende Prioritätsebenen enthält;
- Unterteilen (320) der ersten Bandbreitenweite, so daß jede Programmkategorie einen Abschnitt der ersten Bandbreitenweite empfängt;
- Bilden (320) einer ersten Bandbreitenzuordnung durch Zuordnen der ersten Bandbreitenweite zu den Pro-

grammen mit hoher Priorität in jeder Kategorie;
Fortsetzen des Bildens (400) des ersten Zuweisungsschritts mit den stetig abnehmenden Prioritätsebenen bis wenigstens eine der folgenden Bestimmungen auftritt:

alle Programme sind zugeordnet;

alle aus der ersten Bandbreitenweite sind zugeordnet;

Unterteilen der zweiten Bandbreitenweite, so daß jede Programmkategorie einen Abschnitt der zweiten Bandbreitenweite empfängt;

Bilden (320) einer zweiten Bandbreitenzuordnung durch Zuordnen der zweiten Bandbreitenweite zu den Programmen mit der hohen Priorität in jeder Kategorie;

Fortsetzen des Bildens des zweiten Zuordnungsschritts mit den stetig abnehmenden Prioritätsebenen bis wenigstens eine der folgenden Bedingungen erfüllt ist:

alle Programme sind zugeordnet;

alle aus der zweiten Bandbreitenweite sind zugeordnet;

Übertragen der ersten Bandbreitenzuordnung zu der ersten Kabel-Empfangsstelle (208); und

Übertragen der zweiten Bandbreitenzuordnung zu der zweiten Kabel-Empfangsstelle (208).

- 23.** Verfahren gemäß Anspruch 18, wobei der Verfahrensschritt Erzeugen eines Programmsteuer-Informationssignals (276) zum Verwenden durch Betrachter der die Menüs von zulässiger Programmierung auf der Grundlage von Programmaufstellungsinformation verwendet, die Verfahrensschritte enthält:

Erhalten und Speichern (400) von Programmaufstellungsinformation für jedes Programm, wobei die Programmaufstellungsinformation einen Programmnamen, eine Programmstartzeit, eine Programmlänge, eine Programmkategorie und einen Programmpreis enthält;

Anordnen (432) der Programmaufstellungsinformation für alle Programme in einer Menükonfiguration;

Erzeugen (430) von Programmsteuerinformation mittels Programmaufstellungsinformation;

Erzeugen (442) eines digitalen Programmsteuer-Informationssignals mittels der Programmsteuerinformation; und

fortlaufendes Übertragen (292, 294, 296) des digitalen Programmsteuer-Informationssignals gleichzeitig mit den Programmen.

- 24.** Verfahren gemäß Anspruch 18, wobei der Verfahrensschritt Erzeugen eines Programmsteuer-Informationssignals ein Erzeugen eines Programmsteuer-Informationssignals zum Übertragen an Betrachter von einer gleichzeitig übertragenen Vielzahl von Fernsehprogrammen enthält, so daß variable Videodarstellungen von laufender und zukünftiger Programmierung erzeugt werden können, und so daß Downstream-Darstellungen der Fernsehprogramme durch die Betrachter ausgewählt und gesteuert werden können, wobei das Verfahren die Verfahrensschritte enthält:

Empfangen (400) als Eingabe Dateneingang, Programmnamen, Startzeiten (412), Programmdauer und Programmkategorie (302, 304, 306, 308, 310, 312) und Preis (414);

Kombinieren (402) der Eingabedaten mit gespeicherten Marketingdaten (420, 422), die die Frequenz, mit der Programme von Betrachtern angeschaut werden und Demographiedaten über die Betrachter enthalten;

Gewichten (424) der Daten gemäß von Algorithmen, die jedem Datentyp ein Bedeutungsgewicht zuweisen;

Erzeugen (430, 432) von Daten einer Programmaufstellung und Programmposition auf Menüformaten aus den Daten;

Darstellen (434) des resultierenden Menüentwurfs zum Editieren;

Editieren (436, 490) des Menüs; und

Verarbeiten (438) des editierten Menüs, um das Programmsteuer-Informationssignal zum Übertragen an die Betrachter zu erzeugen (442).

- 25.** Verfahren gemäß Anspruch 24, wobei das digitale Programmsteuer-Informationssignal an Kabelfranchisenehmer übertragen wird und wobei das Verfahren

eine Einrichtung (404) zum Empfangen spezifischer Information in bezug auf jeden Kabelfranchisenehmer, der das Signal empfängt; und

eine Einrichtung (404) zum Erzeugen eines auf den Kunden abgestellten Signals (428) für jeden Kabelfranchisenehmer

enthält.

26. Verfahren gemäß Anspruch 24, wobei das Programmsteuer-Informationssignal auch Information zum Kennzeichnen virtueller Kanäle für interaktive Dienstleistungen (304) und Datendienstleistungen (312), die Betrachtern mittels Dienstleistungsinformation (503) zugänglich sind, enthält, wobei das Verfahren weiter die Verfahrensschritte aufweist:

Sammeln von Dienstleistungsinformation (503) für die möglichen Datendienstleistungen (312);
 Inventarisieren der interaktiven Dienstleistungen (304), die dem Betrachter zugänglich gemacht werden;
 Zuordnen eines virtuellen Kanals für die Datendienstleistungen (312) und die interaktiven Dienstleistungen (304);
 Bestimmungsverfahren zum Upstream-Übertragen für interaktive Dienstleistungen (304); und
 Erzeugen eines Menüs von interaktiven Dienstleistungen (304) und Datendienstleistungen (312) für späteres Verarbeiten.

27. Verfahren gemäß Anspruch 18, wobei der Verfahrensschritt Erzeugen einer Programmaufstellung ein Verfahren enthält zum Unterstützen eines Programmpaketbilders, um ein übertragbares Dateninformationssignal zu erzeugen, das die gespeicherte Information über zu betrachtende mögliche Fernsehprogramme in Programmaufstellungen anordnet und ein Programminformationssignal (276) aus den Programmaufstellungen erzeugt (442), um eine Auswahl von Fernsehprogrammen zum Betrachten durch die Betrachter zu ermöglichen, wobei das Verfahren die Verfahrensschritte aufweist:

Empfangen (400) von Information von zur Betrachtung verfügbaren Fernsehprogrammen;
 Anordnen (430) der Information von zur Betrachtung verfügbaren Programmen in Programmaufstellungsinformation mittels gespeicherter Computerbefehle, die einen Satz Computerbefehle zum Verwenden der gespeicherten Daten, um eine optimale Auswahl von Fernsehprogrammen, die von jedem Betrachter angeschaut werden sollen, enthält;
 Editieren (436) der Programmaufstellungsinformation;
 Erzeugen (442) des Programmsteuer-Informationssignals (276) mittels der Programmaufstellungsinformation; und
 Übertragen (292, 294, 296) des Programmsteuer-Informationssignals (276) als digitales Datensignal, so daß die Fernsehprogramme, die von einem Betrachter ausgewählt werden können, zur Auswahl durch einen Betrachter dargestellt werden.

28. Verfahren gemäß Anspruch 27, weiter aufweisend die Verfahrensschritte Sammeln von Information über Programmsehverhalten von Betrachtern, und wobei der Anordnungsschritt weiter

zielgerichtetes Bestimmen eines Fernsehprogramm (402) und
 Verwalten (402) der Ausbeute von Information über Programmsehverhalten für das Zielprogramm, so daß das Zielprogramm eine höhere Information über Programmsehverhalten erlangt.

29. Verfahren gemäß Anspruch 27, wobei wenigstens ein Fernsehprogramm eine Programmdienstleistung, die eine zeitbegrenzte Serie von Programmierung enthält, die eine bestimmte Zeit an jedem Tag für eine begrenzte Zahl von Kalendertagen anbietet, und wobei das Programmsteuer-Informationssignal (276) Information, die eine Kennung und eine Beschreibung der Dienstleistung, die Start- und Enddaten und die Zeiten an jedem Tag, an dem die Dienstleistung durch die Betrachter angeschaut werden kann, enthält.

30. Verfahren gemäß Anspruch 18, wobei der Verfahrensschritt Erzeugen einer Programmaufstellung ein Verfahren zum Erzeugen von Programmdienstleistungen mit wenigstens einem Programm und einem Zwischen-Audio/Video zum Übertragen enthält, wobei das Verfahren folgende Verfahrensschritte aufweist:

Erhalten (461) eines oder mehrerer Programme und des Zwischen-Audio/Video;
 Erzeugen (460) von Ereignissen mit
 Kombinieren (462) eines oder mehrerer Programme mit einem oder mehrerer Zwischen-Audio/Video, so daß ein Ereignis länger ist als eines oder mehrerer der kombinierten Programme; und
 Erzeugen (464) einer Ereigniskennung zum Wiederaufrufen des Ereignisses;
 Erzeugen von Programmdienstleistungen mit
 Integrieren einer oder mehrerer Ereignisse mittels der Ereigniskennung, so daß keine Unterbrechung der Programme oder des Zwischen-Audio/Video auftritt;
 Bestimmen (318) von Kalendertagen, an denen die Programmdienstleistung übertragen wird;

Festlegen (400) der Tageszeit, an der die Programmdienstleistung übertragen wird; und
Übertragen (292, 294, 296) der Programmdienstleistung mit den integrierten Ereignissen an den vorbestimmten Kalendertagen zu der vorbestimmten Zeit.

- 5 **31.** Verfahren gemäß Anspruch 30, wobei die Programmdienstleistungen durch den Betrachter bezahlt werden, und das Verfahren weiter die Schritte aufweist:

Erzeugen eines Mini-Pay bestehend aus einem oder mehreren Programmdienstleistungen; und
Zuweisen eines Preises zu dem Mini-Pay.

10

- 32.** Verfahren gemäß Anspruch 18, dadurch gekennzeichnet, daß der Verfahrensschritt Erzeugen einer Programmaufstellung ein Verfahren zum Erzeugen von Nah-Video-On-Demand-Dienstleistungen mittels Programmen enthält, wobei die Nah-Video-On-Demand-Dienstleistung von einer zentralen Stelle für die Verteilung an die Teilnehmer übertragen wird, mit den Verfahrensschritten:

15

Zuweisen (400) eines für die Teilnehmer zugänglichen Programms mehr als einmal an einem Tag;
Auswerten (400) der Länge des zugewiesenen Programms;
Erzeugen (400) von Programmstartzeiten unter Verwendung der ausgewerteten Programmlänge;
Anordnen (430) einer Programmaufstellung mit dem bestimmten Programm und den Programmstartzeiten, so daß das Programm in der Programmaufstellung mehr als einmal auftaucht und wobei mehr als ein bestimmtes Programm in der Programmaufstellung ist; und
wobei der Verfahrensschritt Erzeugen (442) eines Programmsteuer-Informationssignals (276) die geordneten Programmaufstellungen verwendet.

20

- 25 **33.** Verfahren gemäß Anspruch 32, wobei Programme innerhalb von fünfzehn Minuten angefordert werden können, wobei der Verfahrensschritt Erzeugen von Programmstartzeiten umfaßt:

Teilen der ausgewerteten Programmlänge in eine Vielzahl von fünfzehn Minuten langen Segmenten und ein letztes Segment; und
Bestimmen von Zwischen-Audio/Video zum Hinzufügen zu dem letzten Segment.

30

- 34.** Verfahren gemäß Anspruch 32, wobei ein Monitor verwendet wird und das Verfahren weiter gekennzeichnet ist durch

graphisches (438) Neuordnen der Programmaufstellung mittels eines Monitors vor dem Erzeugen des Programmsteuer-Informationssignals.

35

- 35.** Verfahren gemäß Anspruch 18, gekennzeichnet durch den Verfahrensschritt Erzeugen einer Programmaufstellung mittels eines Verfahrens zum Erzeugen einer Nah-Video-On-Demand-Dienstleistung, die Programme verwendet, wobei die Nah-Video-On-Demand-Dienstleistung von einer zentralen Stelle zur Verteilung an die Teilnehmer übertragen wird, mit den Verfahrensschritten:

40

Bestimmen (400) von für die Teilnehmer möglichen Programmen mehr als einmal;
Auswerten (400) der Länge des bestimmten Programms;
Erzeugen (400) von Programmstartzeiten mittels der ausgewerteten Programmlänge;
Anordnen (430) einer Programmaufstellung unter Verwendung der Programmstartzeiten (412), so daß das Programm in der Programmaufstellung mehr als einmal auftaucht;
Erzeugen (434) eines Programmsteuer-Informationssignals mit Hilfe der geordneten Programmaufstellung; und
Übertragen (292, 294, 296) des Programmsteuer-Informationssignals (276) und des bestimmten Programms zu den Teilnehmern, wobei das bestimmte Programm zu den Teilnehmern zu den bestimmten Programmstartzeiten (412) übertragen wird.

45

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- 36.** Verfahren gemäß Anspruch 18, weiter aufweisend ein Verfahren zum Kompilieren und Verwenden von Daten über Programmsehverhalten (420) mit Information über Programme, wobei die Daten über Programmsehverhalten von entfernten Stellen empfangen werden, wobei das Verfahren gekennzeichnet ist durch die Verfahrensschritte:

55

Empfangen (402) von Daten über Programmsehverhalten;

Bestimmen (402) eines Programms zur Analyse;
 Kompilieren (402) der empfangenen Daten über Programmsehverhalten (420) für das bestimmte Programm;
 und
 Verwenden der kompilierten Daten über Programmsehverhalten (420) bei der Bildung einer Programmauf-
 stellung mit
 Bestimmen (430), ob die kompilierten Daten geeignet sind, um das bestimmte Programm in einen bestimmten
 Zeitschlitz anzuordnen; und
 Zuordnen (430) eines Zeitschlitzes für das bestimmte Programm in der Programmaufstellung.

37. Verfahren gemäß Anspruch 35, wobei die Menüs mit einem Menüraum unter Verwendung der Daten über Pro-
 grammsehverhalten aufgeführt werden, weiter gekennzeichnet durch den Verfahrensschritt:

Zuordnen von Menüraum für das bestimmte Programm unter Verwendung der Programmaufstellung.

38. Verfahren gemäß Anspruch 18, wobei der Paketierungsschritt ein Verfahren zum Zuordnen einer gegebenen Band-
 breitenweite zu einer Vielzahl von Fernsehprogrammen aus den Programmen, die durch die Empfangseinrichtung
 (272) empfangen werden, enthält, wobei jedes Programm zu einer aus einer Vielzahl von Genrekategorien gehört,
 wobei das Zuordnungsverfahren die Verfahrensschritte aufweist:

Zuordnen von Prioritäten (400) zu jedem der Programme durch Zuordnen einer aus einer Vielzahl von Prio-
 ritätsebenen zu jedem der Programme, wobei die Vielzahl von Prioritätsebenen eine hohe Prioritätsebene
 und stetig abnehmende Prioritätsebenen enthält, wodurch die Programme mit einer höheren Prioritätsebene
 von Systemen mit einer begrenzten Bandbreite akzeptiert werden;

Unterteilen der vorgegebenen Bandbreitenweite, so daß jede Programmkategorie einen Abschnitt der vorge-
 gegebenen Bandbreitenweite empfängt;

Zuordnen (326) der gegebenen Bandbreitenweite zu Programmen mit hoher Priorität in jeder Kategorie; und
 Fortsetzen des Zuordnungsschritts der stetig abnehmenden Prioritätsebenen bis wenigstens eine der folgen-
 den Bedingungen auftritt:

alle Programme sind zugeordnet,

alle aus der vorgegebenen Bandbreitenweiten sind zugeordnet.

Revendications

1. Dispositif pour un système de distribution de programmes télévisés caractérisé en ce qu'il comporte :

des moyens de réception (272) pour recevoir des programmes télévisés dans un format analogique ou nu-
 mérique, ayant chacun des composantes vidéo et audio, les moyens de réception (72) incluant au moins un
 port de réception ;

des moyens de coordination, reliés aux moyens de réception (272), pour coordonner la réception des pro-
 grammes télévisés ;

des moyens d'entrée (262) pour recevoir des instructions d'entrée et des informations spécifiques concernant
 chacun des programmes télévisés ;

des moyens (268) formant base de données, incluant une unité centrale de traitement (264), reliés aux moyens
 d'entrée (262), pour mémoriser et fournir des informations concernant les programmes télévisés ;

des moyens de génération (264), reliés aux moyens d'entrée (262) et aux moyens (268) formant base de
 données, pour générer un signal d'informations de gestion de programmes (276) basé sur l'entrée en prove-
 nance des moyens d'entrée (262) et des moyens (268) formant base de données, le signal (276) contenant
 une identification spécifique concernant chaque programme télévisé d'un sous-ensemble de programmes
 télévisés reçus par les moyens de réception (272), incluant la date et l'horaire d'affichage et la catégorie dans
 laquelle tombe le programme télévisé ;

des moyens de combinaison (270), reliés aux moyens de génération (264) et aux moyens de réception (272),
 pour combiner le sous-ensemble de programmes télévisés identifié dans le signal d'informations de gestion
 de programmes (276), en vue d'une préparation à une émission ;

des moyens de multiplexage (290), incluant un multiplexeur, reliés aux moyens de combinaison (270), pour
 multiplexer les programmes télévisés combinés et le signal d'informations de gestion de programmes (276)
 en vue d'une émission ; et

des moyens d'émission (292, 294, 296), incluant un modulateur, reliés aux moyens de multiplexage (290),

pour émettre simultanément le signal d'informations de gestion de programmes multiplexé (276) en association avec les programmes télévisés multiplexés, de sorte que des affichages vidéo puissent être générés à partir du signal d'informations de gestion de programmes et de sorte que les affichages aval des programmes télévisés puissent être sélectionnés et gérés par les téléspectateurs.

2. Dispositif selon la revendication 1, caractérisé en outre en ce qu'il comporte des moyens de conversion (284), reliés aux moyens de réception (272), pour numériser les programmes télévisés reçus dans un format analogique.
3. Dispositif selon la revendication 1, dans lequel les moyens (268) formant base de données incluent en outre des moyens pour mémoriser et pour fournir des informations concernant les téléspectateurs.
4. Dispositif selon la revendication 1, dans lequel les moyens de génération (264) incluent des moyens pour désigner un ensemble de programmes télévisés dont les identités seront incluses dans le signal d'informations de gestion de programmes (276) de sorte que le sous-ensemble de programmes télévisés corresponde à un ou plusieurs éventails de programmes télévisés.
5. Dispositif selon la revendication 1, dans lequel les moyens d'entrée (262) incluent un capteur local et un récepteur sensible à la voix, à des entrées tactiles ou à des touches d'entrée.
6. Dispositif selon la revendication 1, dans lequel au moins l'un des programmes télévisés inclut un programme télévisé qui est émis d'une manière continue et répétée et dans lequel le signal d'informations de gestion de programmes (276) émet d'une manière continue l'horaire de début incrémentiel suivant.
7. Dispositif selon la revendication 1, dans lequel l'unité centrale de traitement (264) combine et analyse les informations qui proviennent des moyens formant base de données et l'entrée qui est entrée à partir des moyens d'entrée (262) pour générer le signal d'informations de gestion de programmes numérique (276).
8. Dispositif selon la revendication 1, dans lequel le dispositif est en outre caractérisé par une mémorisation vidéo interne (267) de programmes télévisés au format analogique ou numérique et par des moyens pour acquérir des flux de programmation télévisée externes, tous accessibles aux moyens de réception (272) et reliés à ces derniers, de sorte qu'une programmation mémorisée d'une manière interne ou une programmation obtenue d'une manière externe puisse être convertie par les moyens de conversion (284), combinée par les moyens de combinaison (270) et émise par les moyens d'émission (292, 294, 296) en association avec un signal d'informations de gestion de programmes (276) associé.
9. Dispositif selon la revendication 1, dans lequel l'unité centrale de traitement (264) comporte des moyens de traitement, pour gérer le contenu du signal d'informations de gestion de programmes, qui sont combinés avec un logiciel commandant les moyens de traitement sur la base d'instructions entrées sur les moyens d'entrée (262), les moyens de traitement et le logiciel combinés étant caractérisés par
 - des moyens (262, 264) pour créer des éventails de programmes à diffuser aux téléspectateurs ;
 - des moyens (264, 268), reliés aux moyens de création (262, 264), pour affecter des priorités aux programmes sur la base d'une pluralité de facteurs parmi lesquels la popularité du programme, son importance pondérée et la largeur de bande dont dispose le téléspectateur pour recevoir la pluralité de programmes ;
 - des moyens (262), reliés aux moyens d'affectation de priorités, pour déclencher l'allocation de menus différents à des classes différentes de téléspectateurs ;
 - des moyens (262), reliés aux moyens de menus, pour déclencher des allocations de largeurs de bande, de sorte que des contenus en programmes différents soient envoyés à des téléspectateurs différents ; et
 - des moyens d'édition (262), reliés aux moyens de menus, pour concevoir, créer et modifier des menus énumérant le contenu en variables créé par les moyens d'affectation de priorités et les moyens d'allocation.
10. Dispositif selon la revendication 1, dans lequel le signal d'informations de données de gestion de programmes inclut une désignation de catégorie pour chaque programme télévisé, chaque désignation de catégorie étant sélectionnée à partir du groupe constitué d'une programmation statique, de services interactifs, de services payants, de retransmissions d'événements sportifs en direct, ou de services de données.
11. Dispositif selon la revendication 1, dans lequel les moyens d'émission (292, 294, 296) incluent des moyens pour émettre le signal vers une pluralité de répondeurs satellite sélectionnables et dans lequel le dispositif est caracté-

térisé en outre par des moyens pour regrouper des programmes télévisés en des groupes séparés en vue d'une émission via des répondeurs sélectionnés.

5 12. Dispositif selon la revendication 1, dans lequel les moyens d'émission (292, 294, 296) incluent des moyens pour émettre le signal vers une pluralité de satellites sélectionnables et le dispositif est caractérisé en outre par des moyens pour regrouper des programmes télévisés en des groupes séparés en vue d'une émission vers des régions géographiques différentes.

10 13. Dispositif selon la revendication 1, dans lequel les moyens (268) formant base de données incluent une pluralité de bases de données et dans lequel le dispositif est caractérisé en outre par des moyens de traitement pour accéder aux bases de données et traiter les informations contenues dans celles-ci afin de fournir le signal d'informations de gestion de programmes requis, les bases de données incluant des informations concernant chaque programme programmé, des enregistrements représentant la source à partir de laquelle chaque programme télévisé a été obtenu, des services d'affichage optionnels disponibles, des prévisualisations disponibles de programmes télévisés, des catégories de programmes pour chaque programme télévisé à émettre et des catégories de prix pour chaque programme télévisé à émettre.

15 14. Dispositif selon la revendication 1, dans lequel les moyens (268) formant base de données incluent une pluralité de bases de données, chaque base de données étant composée de multiples ensembles de données associés, et dans lequel le dispositif est caractérisé en outre par des moyens de traitement pour accéder aux bases de données et traiter les informations contenues dans celles-ci et des moyens de gestion pour déterminer comment commander le dispositif de sorte qu'il fournisse le signal d'informations de gestion requis, les bases de données incluant :

20 des moyens pour mémoriser des informations concernant chaque destination vers laquelle émet le dispositif ;
des moyens pour mémoriser des informations concernant les droits ou la propriété dans chaque source de programme ;

25 des moyens pour mémoriser des informations concernant le prix, la promotion et le conditionnement de chaque diffusion de programme ;

30 des moyens pour mémoriser des informations concernant l'emplacement de mémorisation de chaque programme mémorisé d'une manière interne ; et

des moyens pour mémoriser des informations concernant la commercialisation et la clientèle.

35 15. Dispositif selon la revendication 1, modifié en ce que :

le dispositif est caractérisé en outre par des moyens de collecte internes, reliés aux moyens de réception (272), pour regrouper des programmes télévisés provenant de sources internes et alimenter les programmes télévisés provenant des sources internes vers le port de réception ;

40 les moyens de génération (264) et les moyens d'entrée (262) font partie de moyens de conditionnement pour créer des informations de gestion de programmes et pour conditionner les programmes télévisés en utilisant les informations de gestion de programmes, les moyens de conditionnement incluant :

l'unité centrale de traitement (264) ;

45 les moyens d'entrée (262) qui incluent une interface, reliés à l'unité centrale de traitement (264), pour permettre au conditionneur de programmes d'entrer des informations d'éventail de programmes, l'interface étant reliée d'une manière fonctionnelle à l'unité centrale de traitement (264) ;

des moyens de mémorisation, reliés à l'unité centrale de traitement (264) , pour mémoriser les informations d'éventail de programmes entrées ;

des moyens logiques (264), reliés à l'unité centrale de traitement (264), pour arranger les informations d'éventail de programmes mémorisées et créer des informations de gestion de programmes ; et

50 des moyens (264), reliés aux moyens logiques (264), pour générer un signal d'informations de gestion de programmes (276) à partir des informations de gestion de programmes ;

les moyens de combinaison (270) combinent l'ensemble de programmes télévisés identifié dans le signal d'informations de gestion de programmes (276) avec le signal d'informations de gestion de programmes (276) pour créer un signal combiné, les moyens de combinaison incluant un processeur de gestion de livraison (260) ;

les moyens de multiplexage (290) multiplexent le signal combiné ; et

les moyens d'émission (292, 294, 296) émettent le signal combiné.

16. Dispositif selon la revendication 15, dans lequel

les moyens de conditionnement incluent des moyens pour générer les configurations de menu (324) ; et
 les moyens de conditionnement génèrent les informations de gestion de programmes en utilisant les configurations de menu.

17. Dispositif selon la revendication 15, caractérisé en outre par :

des moyens (264) pour recevoir des informations de gestion de franchise de câble uniques à partir de franchises de câble ;
 des moyens (269, 328), reliés aux moyens de réception (264), pour mémoriser les informations de gestion de franchise de câble uniques, les moyens de mémorisation incluent la base de données de configurations de franchises de câble (328) ; et
 dans lequel les moyens de génération (264), reliés aux moyens de mémorisation (328), comportent des moyens pour inclure le signal d'informations de gestion de franchises de câble unique dans le signal d'informations de gestion de programmes généré.

18. Procédé pour délivrer des programmes télévisés dans un système de livraison de programmes télévisés caractérisé en ce qu'il comporte les étapes consistant à :

(a) recevoir (272) une pluralité de programmes télévisés au format analogique ou numérique, comportant chacun des composantes vidéo et audio ;
 (b) fournir (262) des informations concernant les programmes télévisés reçus, parmi lesquelles des informations sur les identités des programmes télévisés reçus ;
 (c) mémoriser (268) les informations fournies concernant les programmes télévisés reçus pour les utiliser lors des étapes de livraison des programmes télévisés reçus ;
 (d) créer (400, 316, 318, 342) une pluralité d'éventails de programmes qui identifient les programmes télévisés reçus en utilisant les informations mémorisées concernant les programmes télévisés reçus ;
 (e) générer (326, 442) un signal d'informations de gestion de programmes (276) en utilisant un ou plusieurs des éventails de programmes créés ;
 (f) préparer (332, 334) le signal d'informations de gestion de programmes (276) et une pluralité des programmes télévisés identifiés dans le signal d'informations de gestion de programmes en vue d'une émission ; et
 (g) émettre (292, 294, 296) le signal d'informations de gestion de programmes préparé (276) et les programmes télévisés préparés pour les redistribuer vers là où se trouvent les abonnés, de sorte que les programmes télévisés préparés et émis puissent être regardés par un abonné.

19. Procédé selon la revendication 18, dans lequel l'étape de préparation inclut un procédé pour émettre une pluralité de programmes vers une tête de câble (208), chacun des programmes de la pluralité de programmes correspondant à l'une parmi une pluralité de catégories de genres, l'émission incluant les étapes consistant à :

affecter une priorité (400) à chacun des programmes en assignant à chacun des programmes l'un parmi une pluralité de niveaux de priorité, la pluralité de niveaux de priorité incluant un niveau de priorité élevé et des niveaux de priorité progressivement inférieurs ;
 former (400) une pluralité de signaux, chacun des signaux incluant des programmes correspondant à un seul niveau de priorité ;
 joindre (320) un en-tête à chacun des signaux, l'en-tête identifiant le niveau de priorité pour un signal correspondant, permettant ainsi une reconnaissance par la tête de câble ; et
 émettre (292, 294, 296) chacun des en-têtes et des signaux correspondants vers la tête de câble (208).

20. Procédé selon la revendication 18, dans lequel l'étape de préparation inclut un procédé pour émettre des programmes vers une pluralité de répondeurs, le procédé incluant les étapes consistant à :

affecter une priorité (400) à chacun des programmes en assignant à chacun des programmes l'un parmi une pluralité de niveaux de priorités, la pluralité de niveaux de priorités incluant un niveau de priorité élevé et des niveaux de priorité progressivement inférieurs ;
 former (400) une pluralité de signaux, chacun des signaux incluant des programmes correspondant à un seul niveau de priorité ; et
 émettre (292, 294, 296) les signaux de la pluralité de signaux vers la pluralité de répondeurs, de sorte que

les répondeurs ne reçoivent pas plus d'un signal.

21. Procédé selon la revendication 20, comportant en outre l'étape consistant à modifier d'une manière dynamique l'allocation de la largeur de bande pour au moins l'une des catégories de la pluralité de catégories.

22. Procédé selon la revendication 18, dans lequel l'étape de préparation comporte un procédé pour émettre une pluralité de programmes dans une première quantité de largeur de bande pour une réception par une première tête de câble (208), et dans une seconde quantité de largeur de bande qui est inférieure à la première quantité de largeur de bande pour une seconde tête de câble (208), le procédé comportant les étapes consistant à :

affecter une priorité (400) à chacun des programmes en assignant à chacun des programmes l'un parmi une pluralité de niveaux de priorité, la pluralité de niveaux de priorité incluant un niveau de priorité élevé et des niveaux de priorité progressivement inférieurs ;

diviser (320) la première quantité de largeur de bande de sorte que chaque catégorie de programmes reçoive une partie de la première quantité de largeur de bande ;

former (320) une première allocation de largeur de bande en allouant la première quantité de largeur de bande aux programmes de priorité élevée de chaque catégorie ;

continuer la formation (400) d'une première étape d'allocation avec les niveaux de priorité progressivement inférieurs jusqu'à ce qu'au moins l'une des conditions suivantes apparaisse :

tous les programmes sont alloués ;

la totalité de la première quantité de largeur de bande est allouée ;

diviser la seconde quantité de largeur de bande de sorte que chaque catégorie de programmes reçoive une partie de la seconde quantité de largeur de bande ;

former (320) une seconde allocation de largeur de bande en allouant la seconde quantité de largeur de bande aux programmes de priorité élevée de chaque catégorie ;

continuer la formation d'une seconde étape d'allocation avec les niveaux de priorité progressivement inférieurs jusqu'à ce qu'au moins l'une des conditions suivantes apparaisse :

tous les programmes sont alloués ;

la totalité de la seconde quantité de largeur de bande est allouée ;

émettre la première allocation de largeur de bande vers la première tête de câble (208) ; et

émettre la seconde allocation de largeur de bande vers la seconde tête de câble (208).

23. Procédé selon la revendication 18 dans lequel l'étape consistant à générer un signal d'informations de gestion de programmes (276) à utiliser par des téléspectateurs utilisant des menus de programmation accessibles sur la base d'informations d'éventail de programmes comporte les étapes consistant à :

obtenir et mémoriser (400) des informations d'éventail de programmes pour chaque programme, les informations d'éventail de programmes comportant un nom de programme, un horaire de début de programme, une durée de programme, une catégorie de programme et un prix de programme ;

arranger (432) les informations d'éventail de programmes pour tous les programmes dans une configuration de menu ;

créer (430) des informations de gestion de programmes en utilisant les informations d'éventail de programmes ;

générer (442) un signal numérique de données d'informations de gestion de programmes en utilisant les informations de gestion de programmes ; et

émettre d'une manière continue (292, 294, 296) le signal numérique de données d'informations de gestion de programmes en même temps que les programmes.

24. Procédé selon la revendication 18 dans lequel l'étape consistant à générer un signal d'informations de gestion de programmes comporte la génération d'un signal d'informations de gestion de programmes pour l'émission vers les téléspectateurs d'une pluralité de programmes télévisés émis simultanément de sorte que des affichages vidéo variables de programmation courante et future puissent être générés et de sorte que les affichages aval des programmes télévisés puissent être sélectionnés et gérés par les téléspectateurs, le procédé consistant à :

recevoir (400) comme entrée de données d'entrée des noms de programme, des horaires de début (412), durée de programme et catégorie de programme (302, 304, 306, 308, 310, 312) et prix (414) ; combiner (402) les données d'entrée avec des données commerciales mémorisées (420, 422) parmi lesquelles la fréquence avec laquelle les programmes sont regardés par les téléspectateurs et les informations démographiques de téléspectateurs ;
 5 pondérer (424) les données conformément à des algorithmes qui assignent un poids d'importance à chaque type de données ;
 générer (430, 432), à partir des données, un éventail de programmes, et une position de programme sur des formats de menu ;
 10 afficher (434) le menu ébauché résultant pour une édition ;
 éditer (436, 400) le menu ; et
 traiter (438) le menu édité pour générer (442) le signal d'informations de gestion de programmes pour une émission vers les téléspectateurs.

- 15 **25.** Procédé selon la revendication 24 dans lequel un signal numérique d'informations de gestion de programmes est émis vers des franchises de câble et dans lequel le procédé comporte en outre :

des moyens (404) pour recevoir des informations spécifiques concernant chaque franchise de câble qui reçoit le signal ; et
 20 des moyens (404) pour créer un signal personnalisé (428) pour chaque franchise de câble.

- 26.** Procédé selon la revendication 24 dans lequel le signal d'informations de gestion de programmes contient aussi des informations pour identifier des canaux virtuels pour des services interactifs (304) et des services de données (312) accessibles aux téléspectateurs en utilisant des informations de service (503) ; le procédé comportant en
 25 outre les étapes consistant à :

collecter des informations de service (503) sur les services de données (312) disponibles ;
 inventorier les services interactifs (304) à rendre accessibles au téléspectateur ;
 assigner un canal virtuel pour les services de données (312) et les services interactifs (304) ;
 30 déterminer un procédé de transmissions amont pour services interactifs (304) ; et
 créer un menu pour services interactifs (304) et services de données (312) pour un traitement ultérieur.

- 27.** Procédé selon la revendication 18 dans lequel l'étape consistant à créer un éventail de programmes inclut un procédé pour aider un conditionneur de programmes à créer un signal d'informations de données transmissibles
 35 qui organise les informations mémorisées sur des programmes télévisés accessibles au téléspectateur en éventails de programmes et génère (442) un signal d'informations de gestion de programmes (276) à partir des éventails de programmes pour permettre la sélection de programmes télévisés afin que des téléspectateurs puissent les regarder, le procédé comportant les étapes consistant à :

recevoir (400) des informations sur des programmes télévisés pouvant être regardés ;
 organiser (430) les informations sur les programmes télévisés qui peuvent être regardés en informations d'éventail de programmes utilisant des instructions informatiques mémorisées incluant un ensemble d'instructions informatiques pour utiliser les données mémorisées afin d'optimiser la sélection de programmes télévisés à regarder par chaque téléspectateur ;
 45 éditer (436) les informations d'éventail de programmes ;
 générer (442) le signal d'informations de gestion de programmes (276) en utilisant les informations d'éventail de programmes ; et
 émettre (292, 294, 296) le signal d'informations de gestion de programmes (276) en tant que signal de données numériques de sorte que les programmes télévisés à partir desquels un téléspectateur peut effectuer un choix
 50 soient affichés pour une sélection par un téléspectateur.

- 28.** Procédé selon la revendication 27, comportant en outre les étapes consistant à recueillir des informations de programmes regardés à partir de téléspectateurs, et dans lequel l'étape d'organisation consiste en outre à :

55 cibler (402) un programme télévisé ; et
 gérer (402) le rendement des informations de programmes regardés pour le programme ciblé de sorte que le programme ciblé conduise à des informations de programmes regardés supérieures.

29. Procédé selon la revendication 27 dans lequel au moins l'un des programmes télévisés est un service de programmes incluant une série limitée dans le temps de programmation offerte pour une durée définie chaque jour pour un nombre limité de jours du calendrier et dans lequel le signal d'informations de gestion de programmes (276) inclut des informations fournissant une identification et une description du service, les dates de début et de fin et les horaires, chaque jour, où le service peut être regardé par les téléspectateurs.

30. Procédé selon la revendication 18, dans lequel l'étape consistant à créer un éventail de programmes inclut un procédé pour créer des services de programmes contenant au moins un programme et une audio/vidéo interstitielle pour une émission, le procédé comportant les étapes consistant à :

obtenir (461) un ou plusieurs programmes et audio/vidéo interstitielle ;
créer (460) des événements, ce qui consiste à :

combiner (462) un ou plusieurs programmes avec une ou plusieurs audio/vidéo interstitielles de sorte qu'un événement soit plus long que le ou les plusieurs programmes combinés ; et
créer (464) une identification d'événement pour se souvenir de l'événement ;

générer des services de programmes, ce qui consiste à :

intégrer un ou plusieurs événements en utilisant l'identification d'événement de sorte qu'il n'y ait aucune interruption des programmes ou de l'audio/vidéo interstitielle ;
déterminer (318) les jours du calendrier où le service de programmes sera émis ;
définir (400) l'horaire du jour où le service de programmes sera émis ;

émettre (292, 294, 296) le service de programmes contenant les événements intégrés, les jours du calendrier déterminés, à l'horaire défini.

31. Procédé selon la revendication 30 dans lequel les services de programmes sont payés par les téléspectateurs, le procédé comportant en outre les étapes consistant à :

créer un mini-abonnement constitué de un ou de plusieurs services de programmes ; et
assigner un prix au mini-abonnement.

32. Procédé selon la revendication 18, caractérisé en ce que l'étape consistant à créer un éventail de programmes inclut un procédé pour créer un service proche de vidéo à la demande en utilisant des programmes dans lequel le service proche de vidéo à la demande est émis à partir d'un emplacement central pour une distribution auprès des abonnés, consistant à :

désigner (400) un programme dont pourront bénéficier les abonnés plus de une fois durant une journée ;
évaluer (400) la longueur du programme désigné ;
créer (400) des horaires de début de programme en utilisant la longueur évaluée du programme ;
organiser (430) un éventail de programmes avec le programme désigné et les horaires de début de programme de sorte que le programme apparaisse dans l'éventail de programmes plus de une fois et dans lequel plus de un programme désigné se trouve dans l'éventail de programmes ; et
dans lequel l'étape consistant à générer (442) un signal d'informations de gestion de programmes (276) utilise les éventails de programmes organisés.

33. Procédé selon la revendication 32 dans lequel des programmes peuvent être demandés en moins de quinze minutes, l'étape consistant à créer des horaires de début de programme consistant à :

diviser la longueur de programme évaluée en de multiples segments de quinze minutes et en au moins un dernier segment ; et
identifier de l'audio/vidéo interstitielle à ajouter au dernier segment.

34. Procédé selon la revendication 32 dans lequel un moniteur est utilisé, le procédé étant en outre caractérisé en ce qu'il consiste à :

réorganiser graphiquement (438) l'éventail de programmes en utilisant un moniteur avant de générer le signal

d'informations de gestion de programmes.

35. Procédé selon la revendication 18, caractérisé en ce que l'étape consistant à créer un éventail de programmes inclut un procédé pour créer un service proche de vidéo à la demande utilisant des programmes, où le service proche de vidéo à la demande est émis à partir d'un emplacement central pour une distribution auprès des abonnés, consistant à :

désigner (400) un programme dont pourront bénéficier les abonnés plus d'une fois ;
 évaluer (400) la longueur du programme désigné ;
 créer (400) des horaires de début de programme en utilisant la longueur évaluée du programme ;
 organiser (430) un éventail de programmes en utilisant les horaires de début de programme (412) de sorte que le programme apparaisse dans l'éventail de programmes plus de une fois ;
 générer (434) un signal d'informations de gestion de programmes en utilisant l'éventail de programmes organisé ;
 émettre (292, 294, 296) le signal d'informations de gestion de programmes (276) et le programme désigné vers les abonnés, dans lequel le programme désigné est émis vers le abonnés aux horaires de début de programme désignés (412).

36. Procédé selon la revendication 18 comportant en outre un procédé pour compiler et utiliser des données de programmes regardés (420) contenant des informations sur les programmes dans lequel les données de programmes regardés sont reçues en provenance de un ou plusieurs emplacements éloignés, le procédé étant caractérisé en outre en ce qu'il comporte les étapes consistant à :

recevoir (402) des données de programme regardé ;
 désigner (402) un programme pour une analyse ;
 compiler (402) les données de programme regardé (420) reçues pour le programme désigné ; et
 utiliser les données de programme regardé (420) compilées dans la formation d'un éventail de programmes, ce qui consiste à :
 déterminer (430) si les données compilées sont favorables pour placer le programme désigné dans un créneau horaire particulier ; et
 allouer (430) un créneau horaire pour le programme désigné dans l'éventail de programmes.

37. Procédé selon la revendication 35 dans lequel des menus ayant un espace de menu sont remplis en utilisant les données de programmes regardés, caractérisé en outre en ce qu'il comporte l'étape consistant à :

allouer un espace de menu pour le programme désigné en utilisant l'éventail de programmes.

38. Procédé selon la revendication 18 dans lequel l'étape de conditionnement inclut un procédé pour allouer une quantité donnée de largeur de bande pour une pluralité de programmes télévisés à partir des programmes reçus par les moyens de réception (272), chacun des programmes correspondant à l'une parmi une pluralité de catégories de genre, le procédé d'allocation comportant les étapes consistant à :

affecter une priorité (400) à chacun des programmes en assignant à chacun des programmes l'un parmi une pluralité de niveaux de priorité, la pluralité de niveaux de priorité incluant un niveau de priorité élevé et des niveaux de priorité progressivement inférieurs, les programmes ayant un niveau de priorité supérieur étant accepté par des systèmes ayant une largeur de bande limitée ;
 diviser la quantité donnée de largeur de bande de sorte que chaque catégorie de programmes reçoive une partie de la quantité donnée de largeur de bande ;
 allouer (326) la quantité donnée de largeur de bande aux programmes de priorité élevée de chaque catégorie ;
 et
 continuer l'étape d'allocation avec les niveaux de priorité progressivement inférieurs jusqu'à ce que au moins l'une des conditions suivantes apparaisse :
 tous les programmes sont alloués,
 la totalité de la quantité donnée de largeur de bande est allouée.

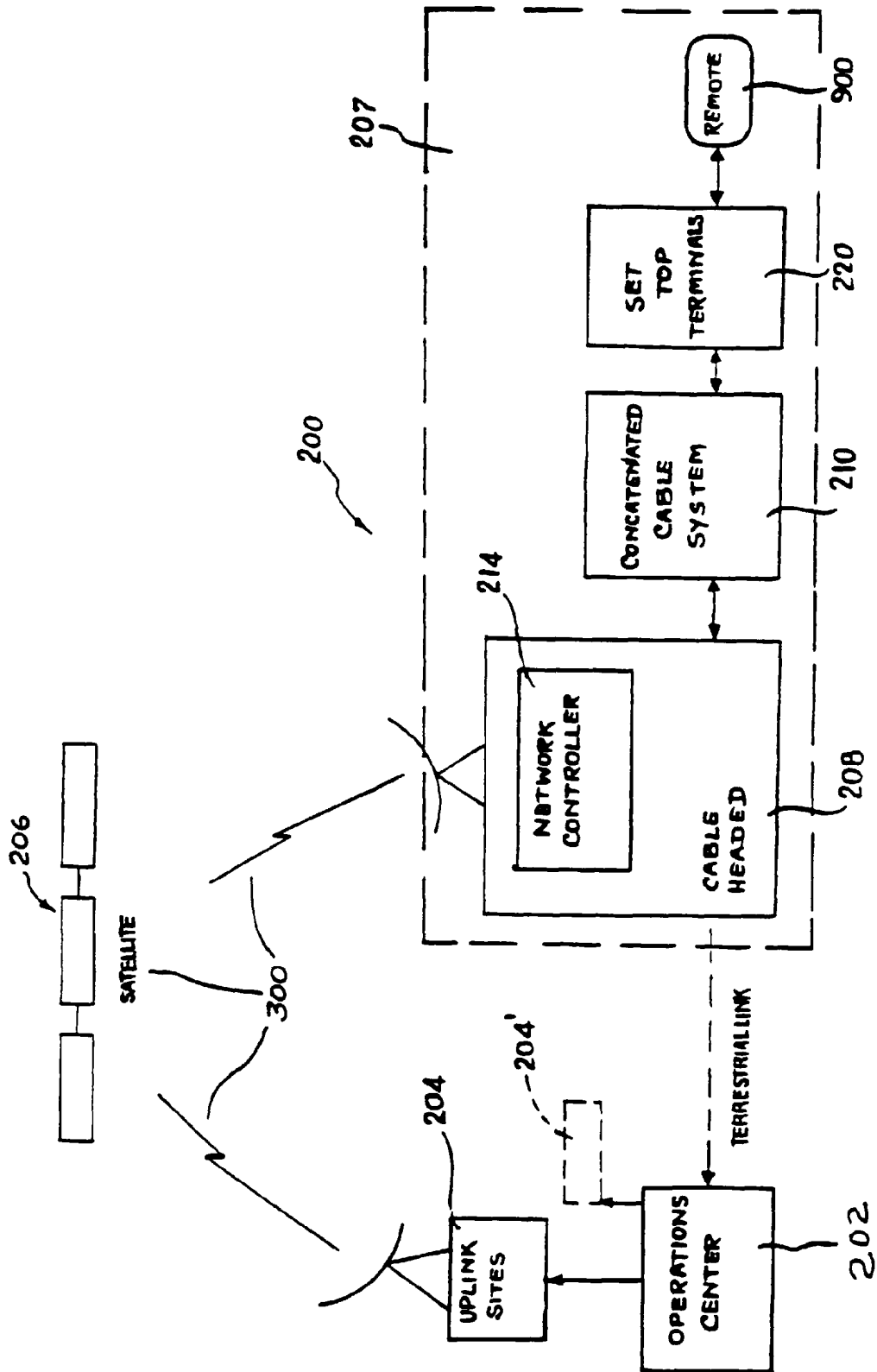


Fig. 1

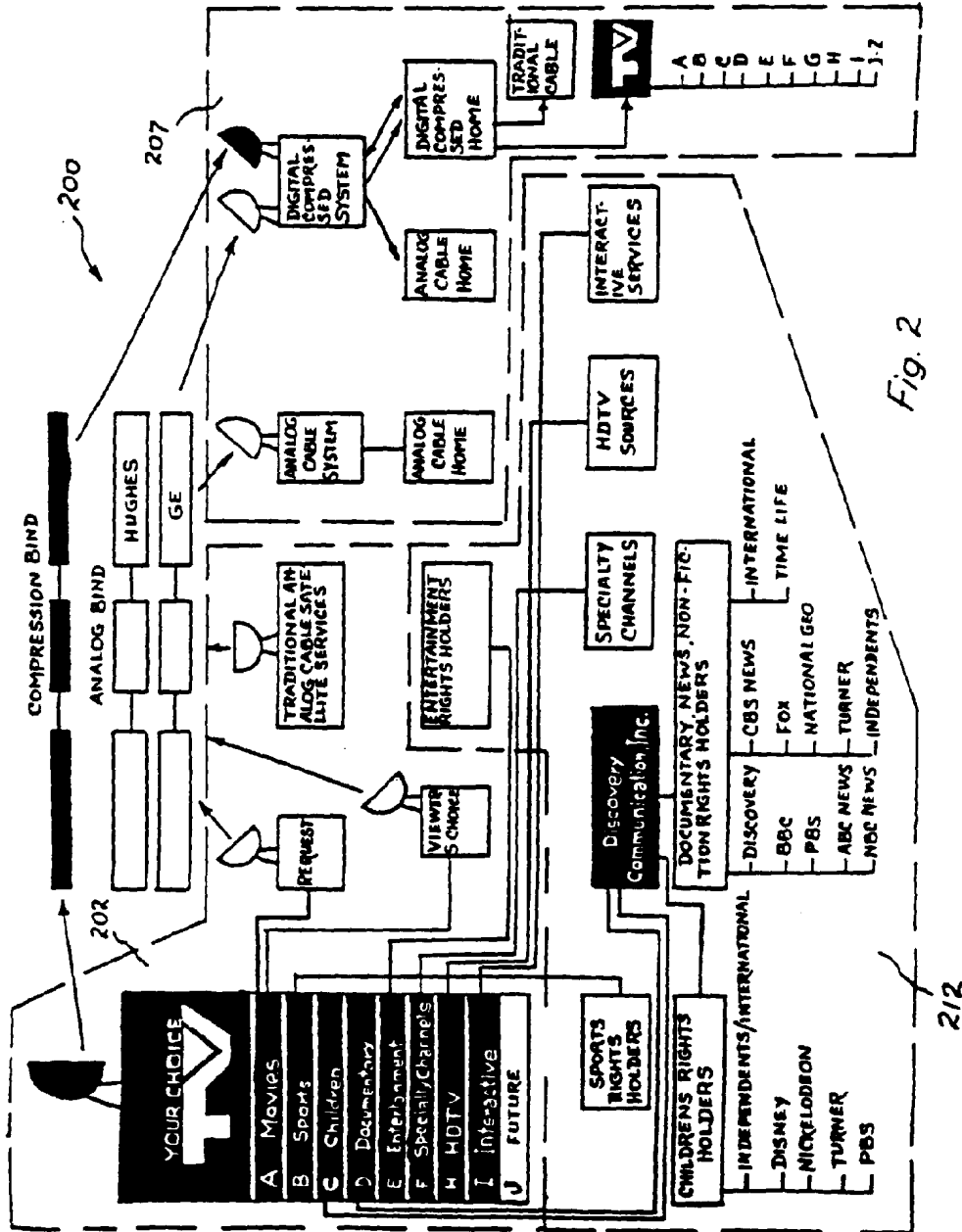


Fig. 2

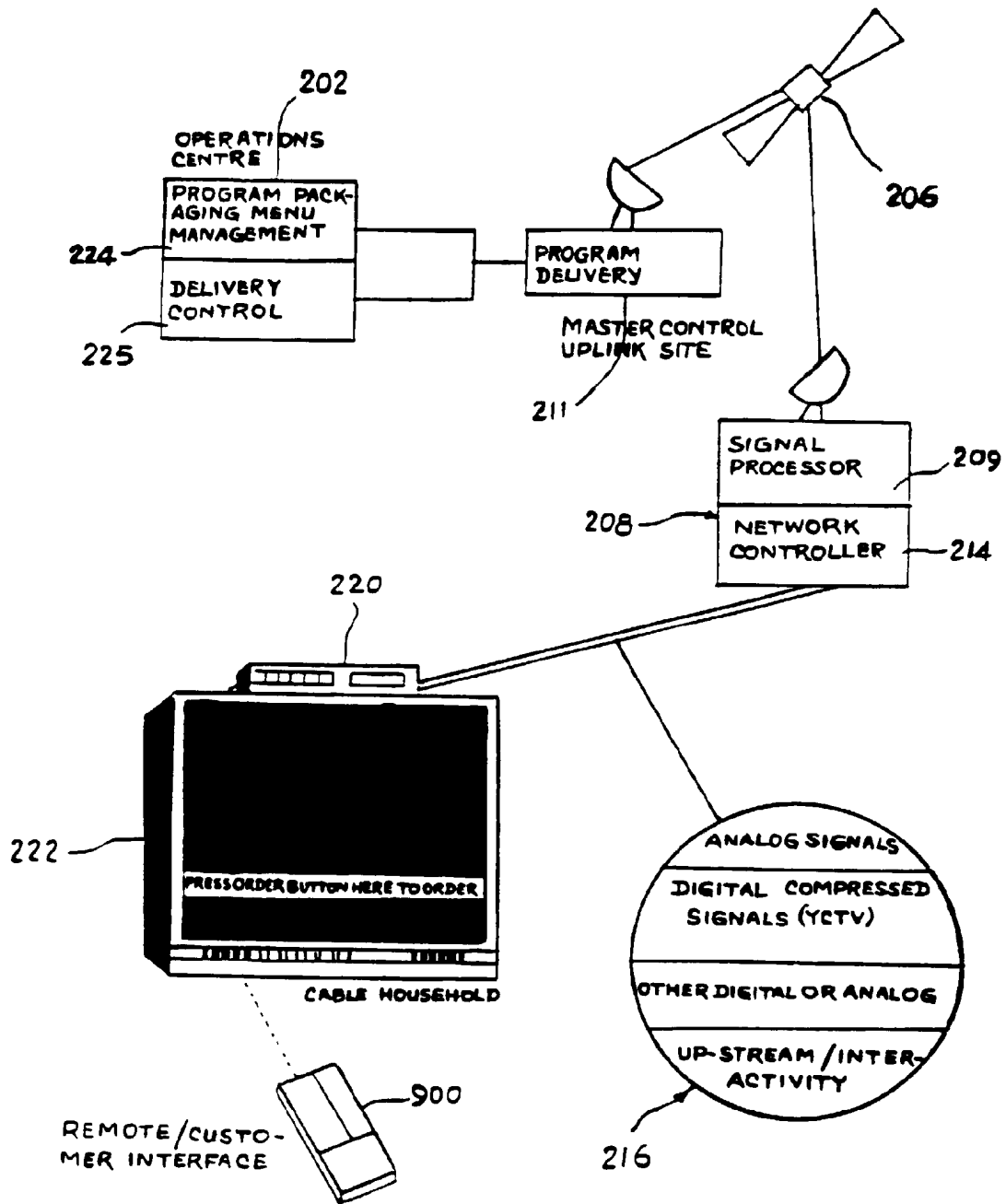


Fig. 3

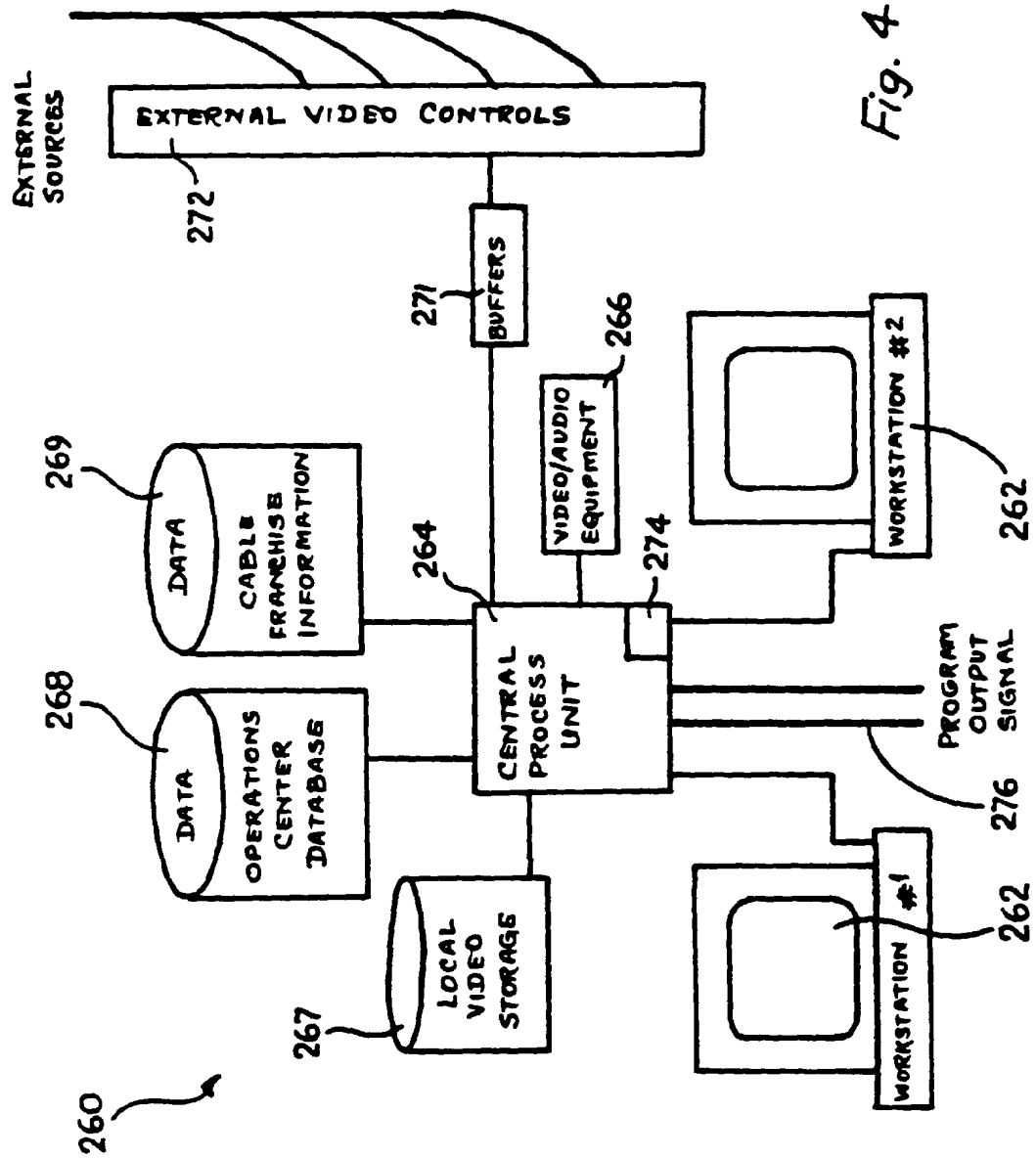


Fig. 4

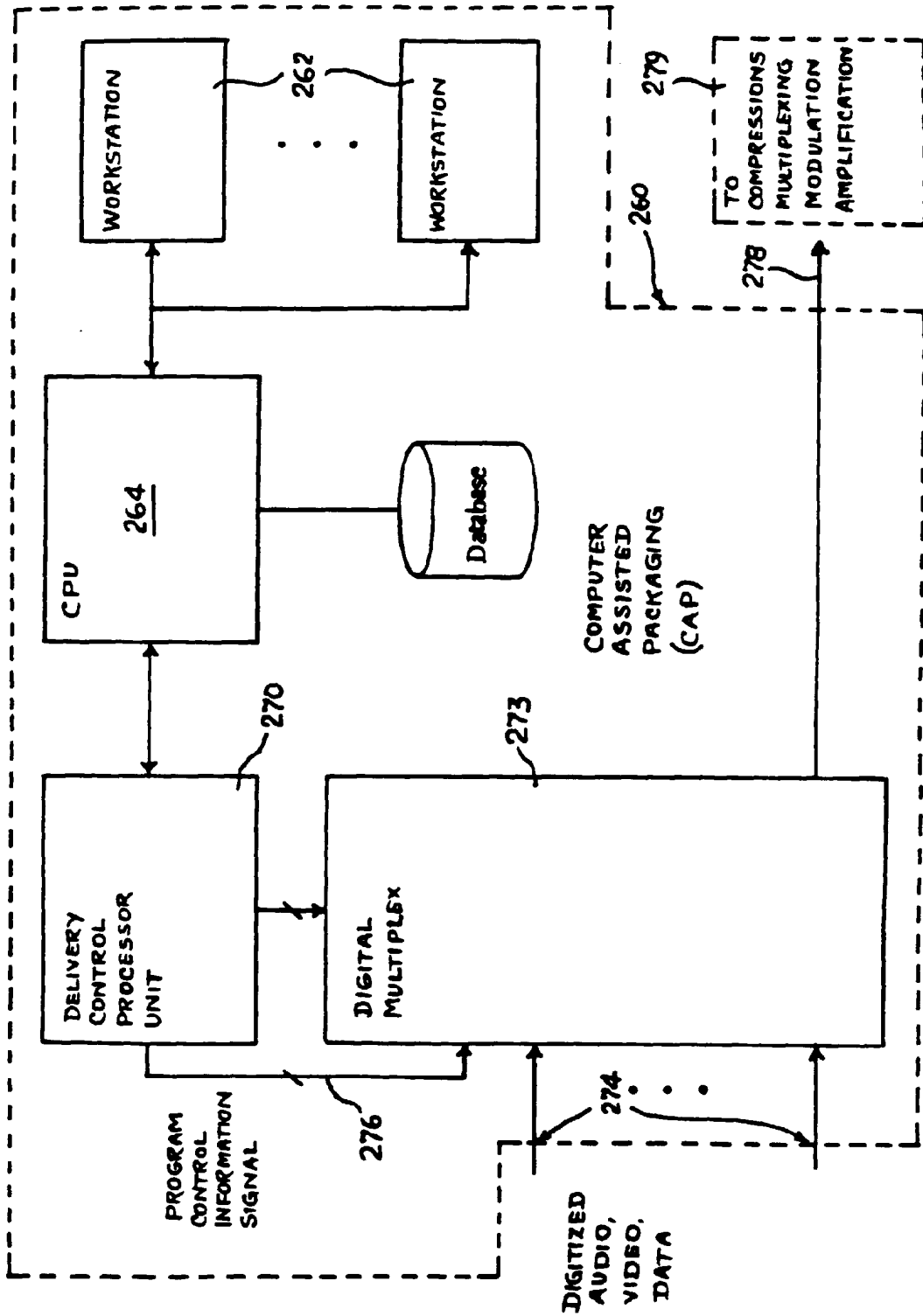
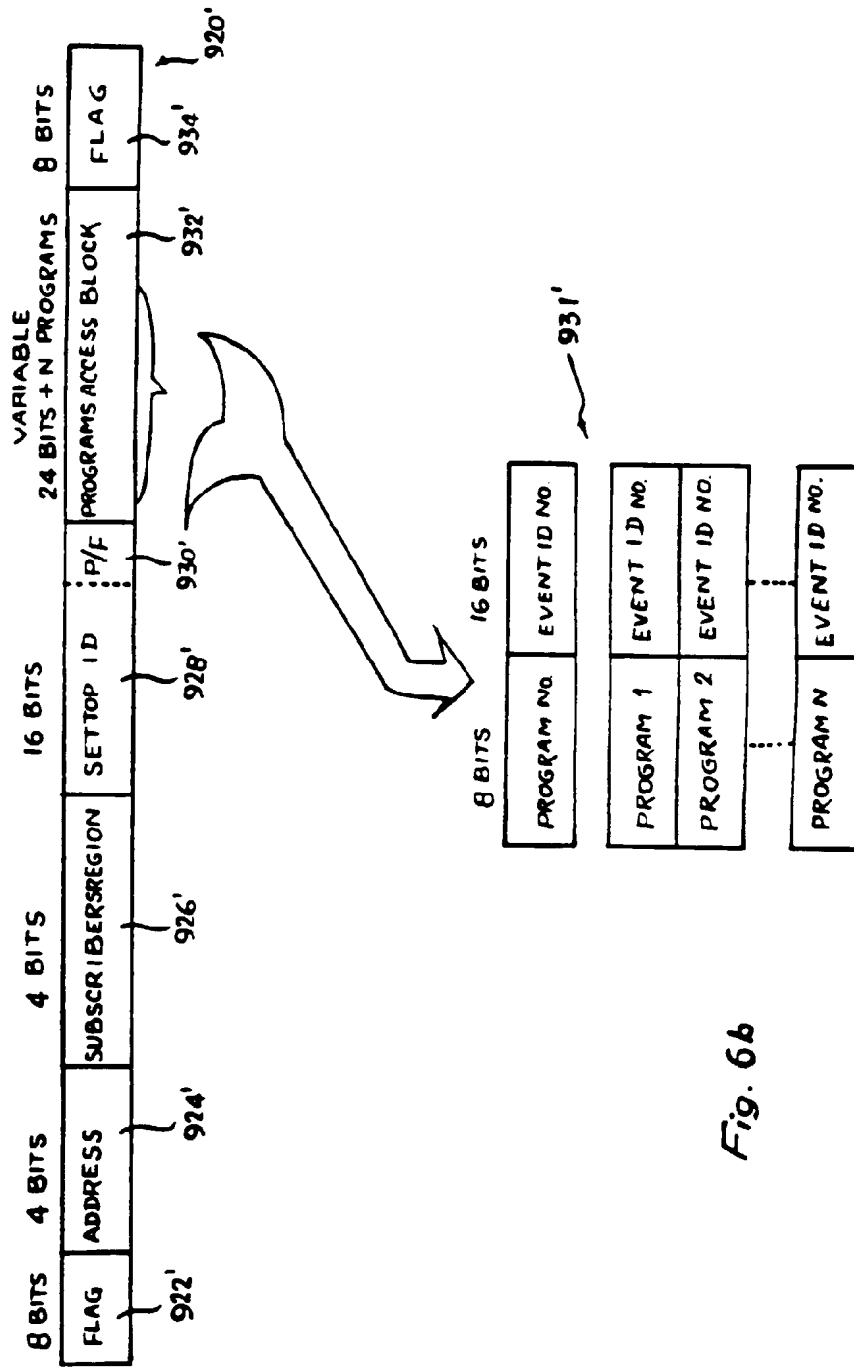
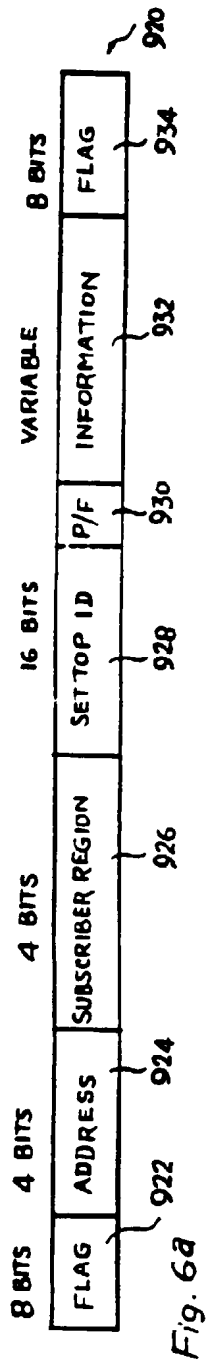


Fig. 5



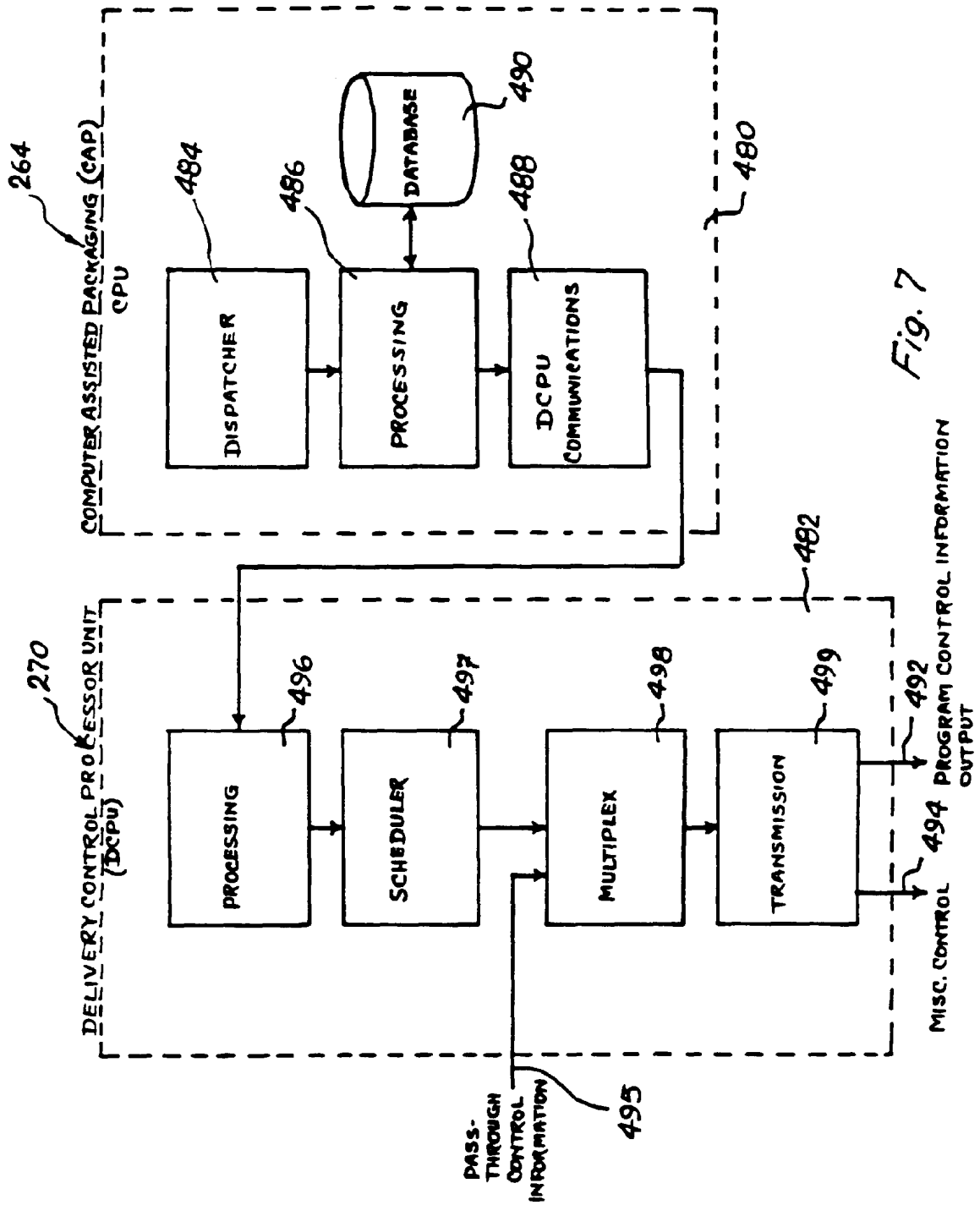


Fig. 7

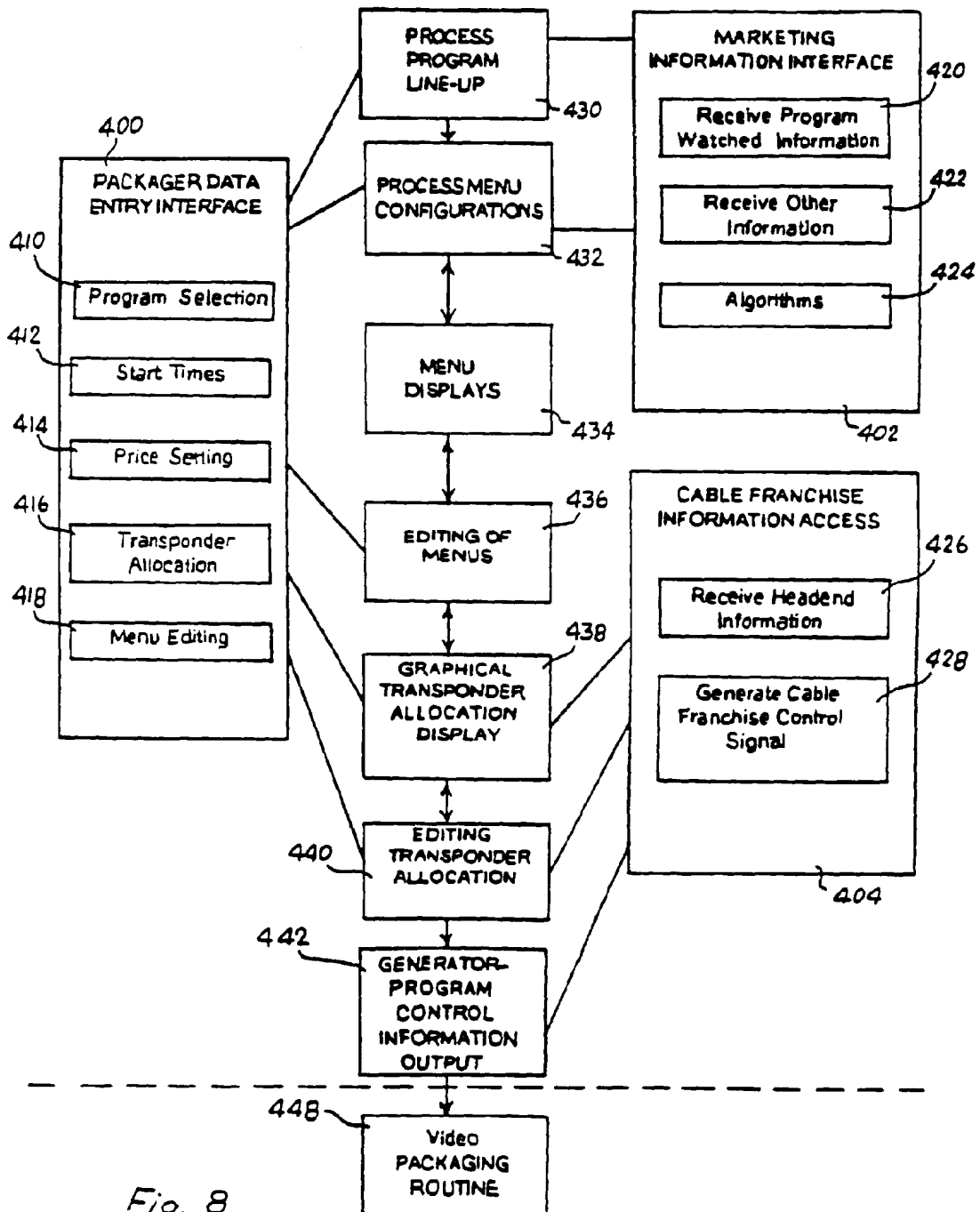


Fig. 8

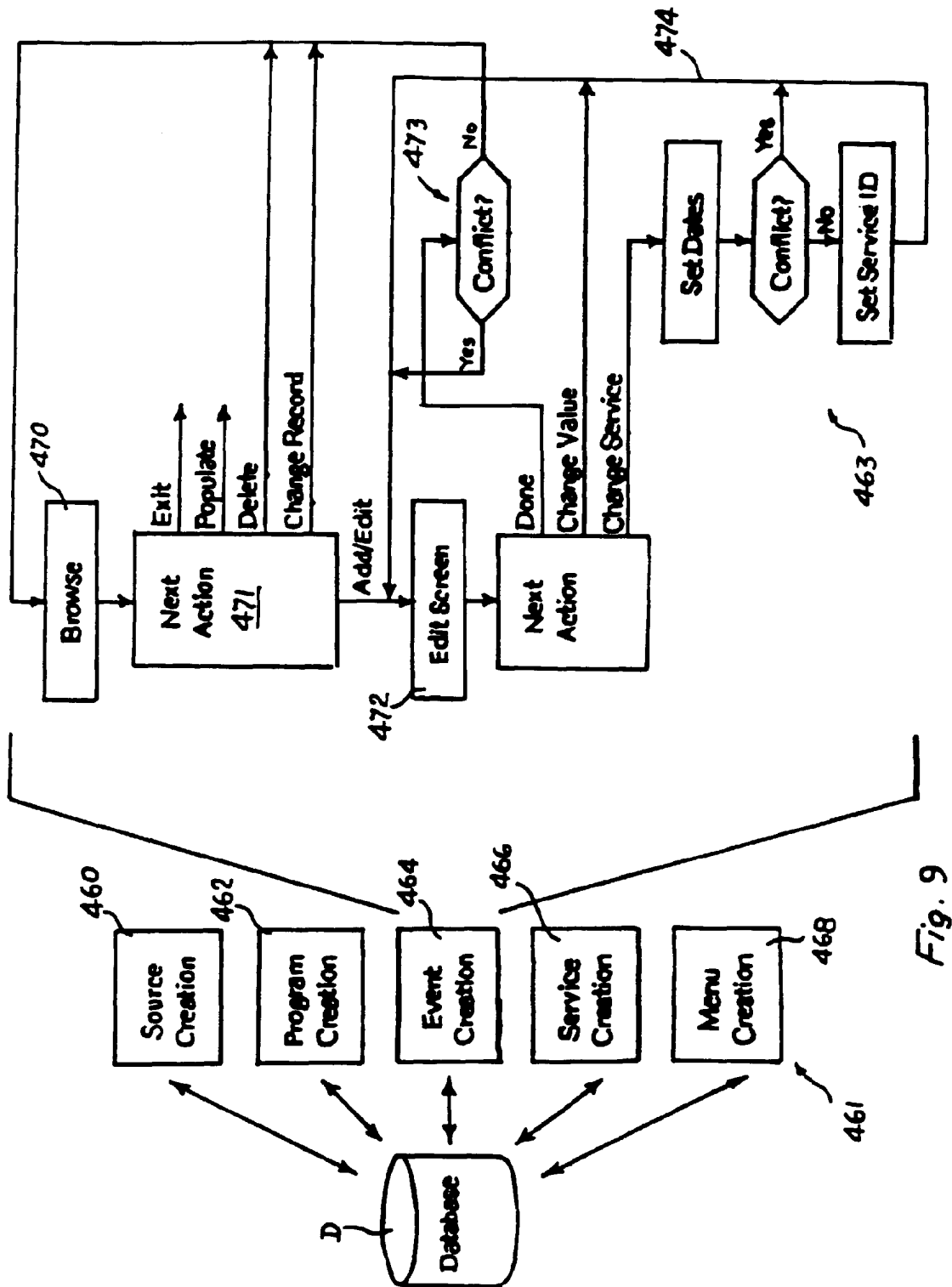
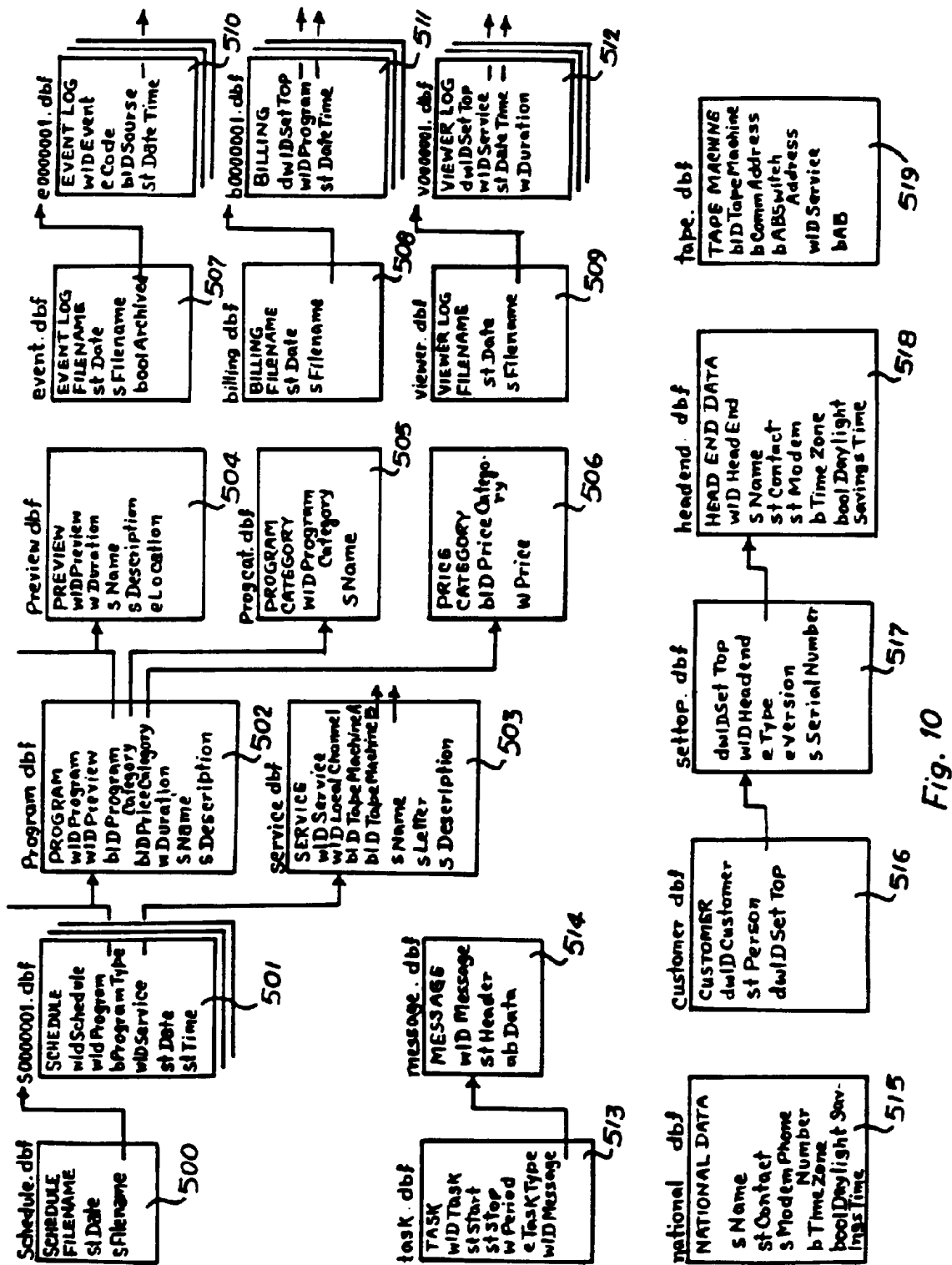


Fig. 9



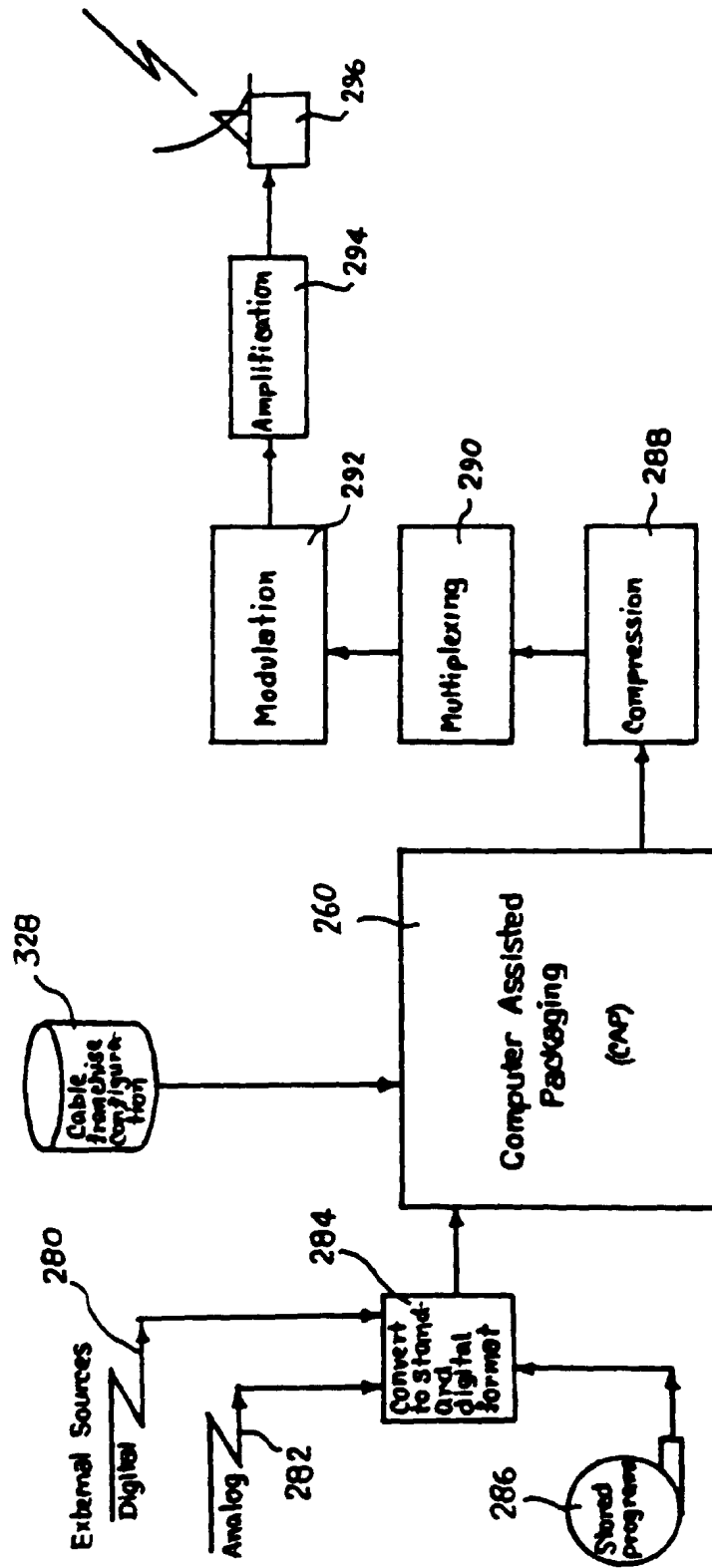


Fig. 11

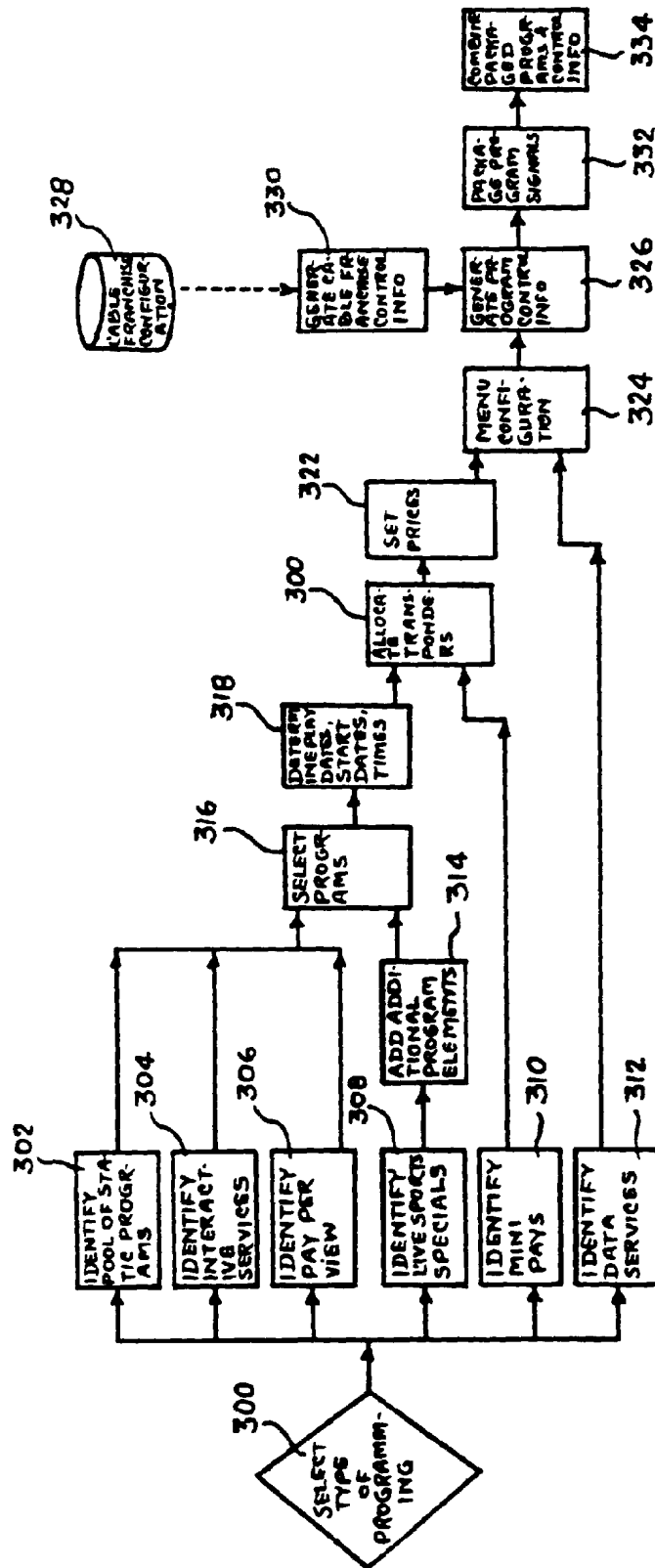


Fig. 12

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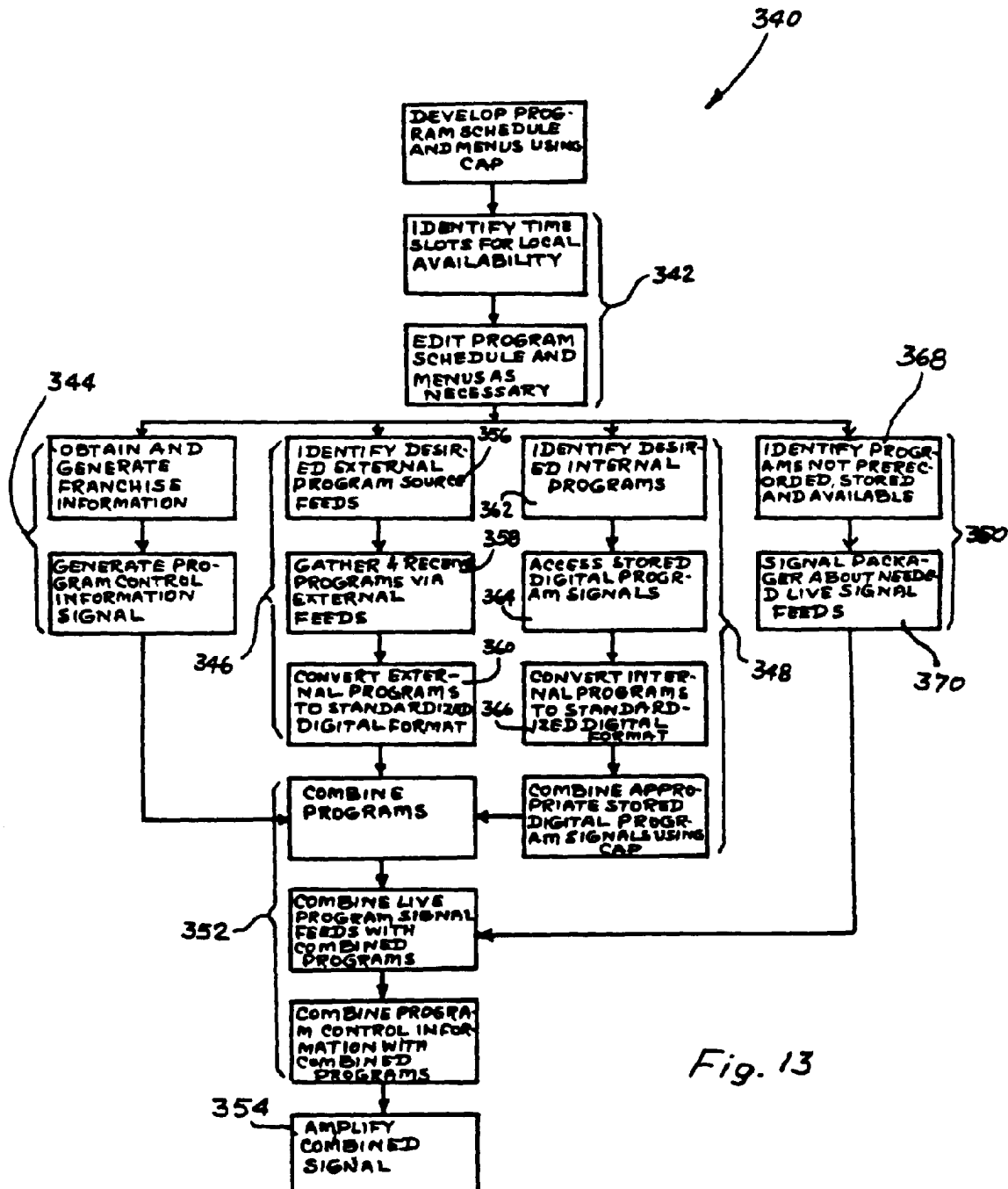


Fig. 13

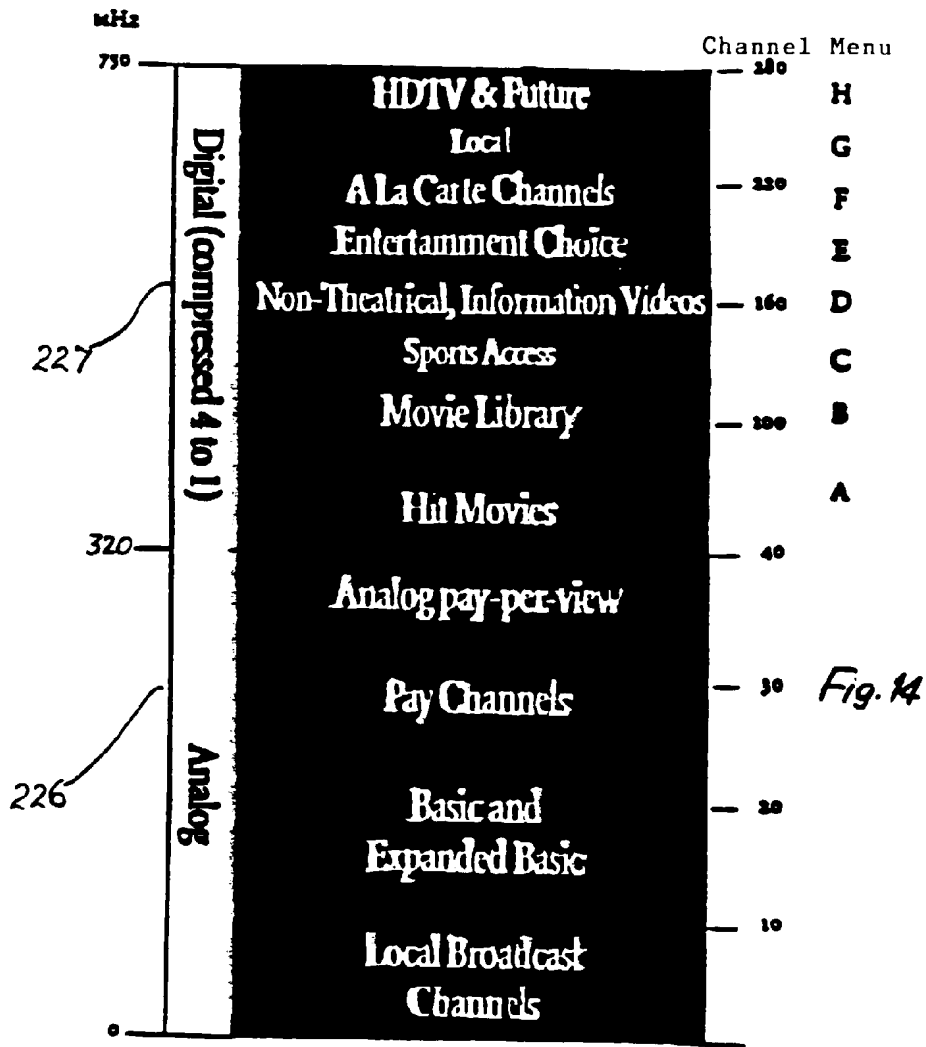


Fig. 15

CHANNEL MENU	PROGRAMMING CATEGORY	CHANNEL ALLOCATED
A	Movies	50
B	Sports	2
C	Childrens	3
D	Documentary	14
E	Entertainment	10
F	Specialty Channels	15
G	Local	N/A
H	HDTV	4
I	Interactive	2
	COMBINED	100

SATELLITE MOVIE
OPTIONS






















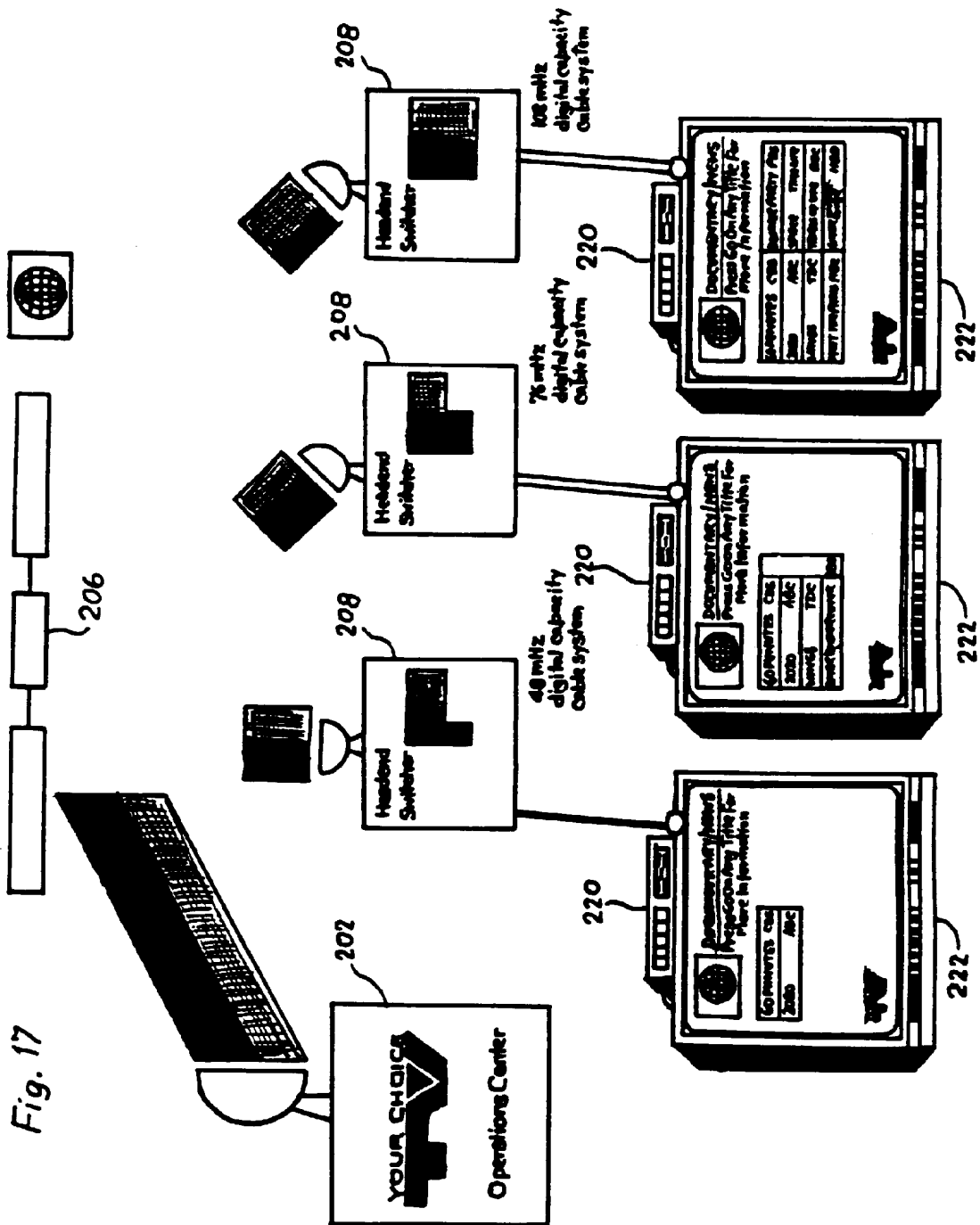
VCTV Combo	Comp. Ratio	AVAILABLE MENUS (1, 2, & 3)	PRIORITY ONE MENUS	PRIORITY ONE PLUS TWO MENUS
1	8:1	 HIT MOVIES 8 movie Selections with start times every 15 minut	 HIT MOVIES 6 movie Selections with start times every 30 minutes	 HIT MOVIES 6 movie Selections with start times every 15 minutes
2	8:1			
3	8:1			
4	8:1			
5	8:1			
6	8:1			
7	8:1			
8	8:1			
9	4:1	 SPORTS 8 Selections	 SPORTS 4 Selections	 SPORTS 4 Selections
10	4:1			
11	8:1	 CHILDRENS 8 Selections	 CHILDRENS 4 Selections	 CHILDRENS 4 Selections
12	8:1	 DOCS/NEWS 8 Selections	 DOCS/NEWS 4 Selections	 DOCS/NEWS 4 Selections
13	8:1	 ENTERTAINMENT 8 Selections	 ENTERTAINMENT 6 Selections	 ENTERTAINMENT 6 Selections
14	8:1	 SPECIAL INTEREST CHANNELS 16 Selections	 SPECIAL INTEREST CHANNELS 8 Selections	 SPECIAL INTEREST CHANNELS 8 Selections
15	8:1			
16	8:1	Promos (1/6 screen) 48	Promos (1/6 screen) 48	Promos (1/6 screen) 48
17	8:1	Data Stream	Data Stream	Data Stream
18	8:1 or 16:9	 MUSIC 32 digit. 1cd Station	 MUSIC 16 digit. 1cd Station	 MUSIC 32 digit. 1cd Stations

Fig. 16

244

240

242



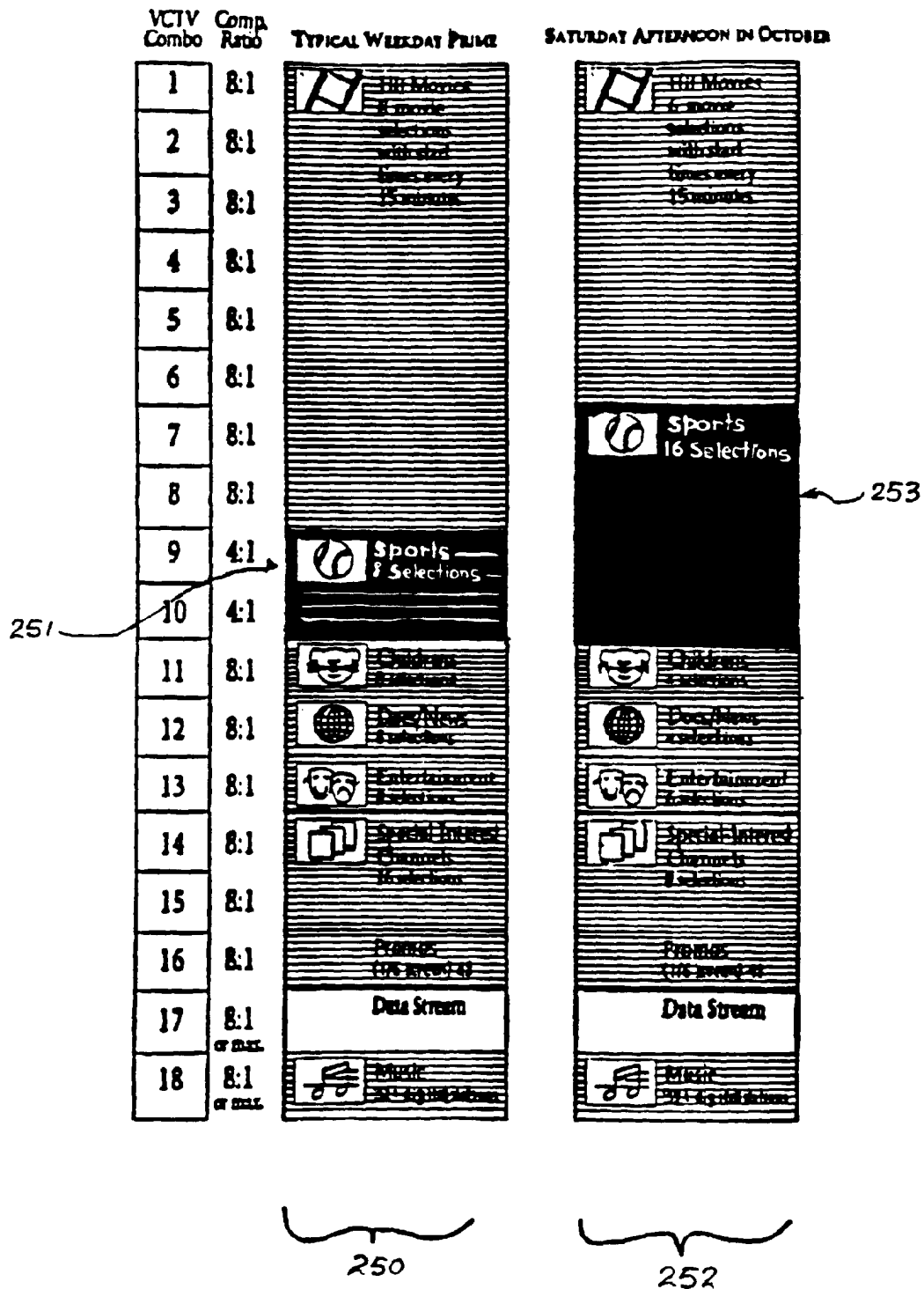
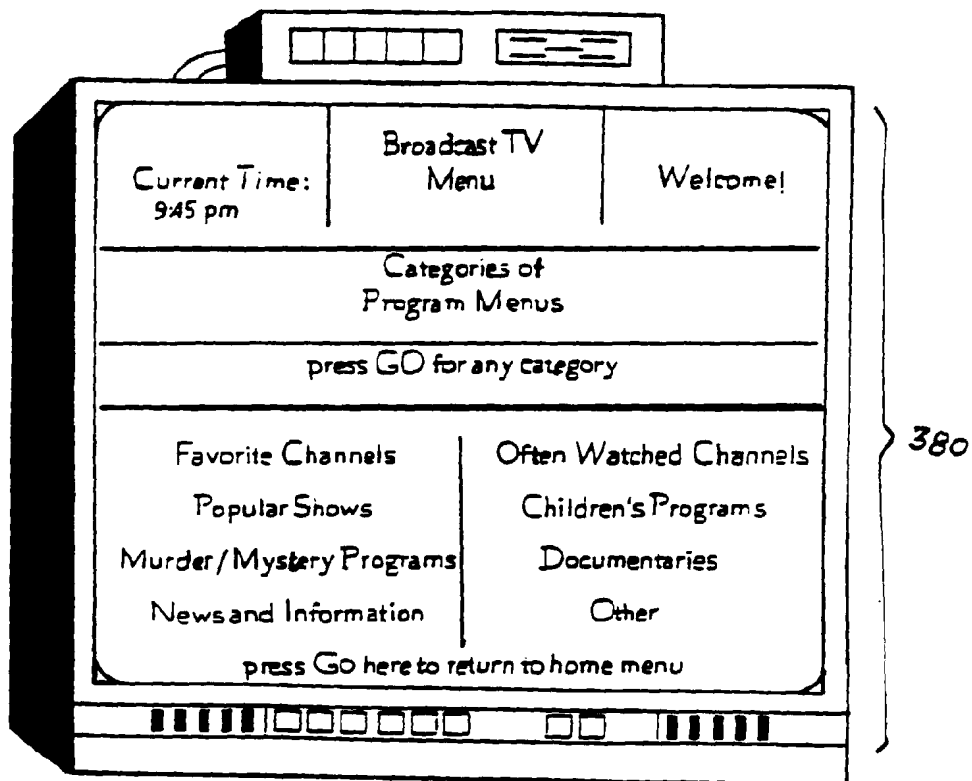


Fig 18

Fig. 19



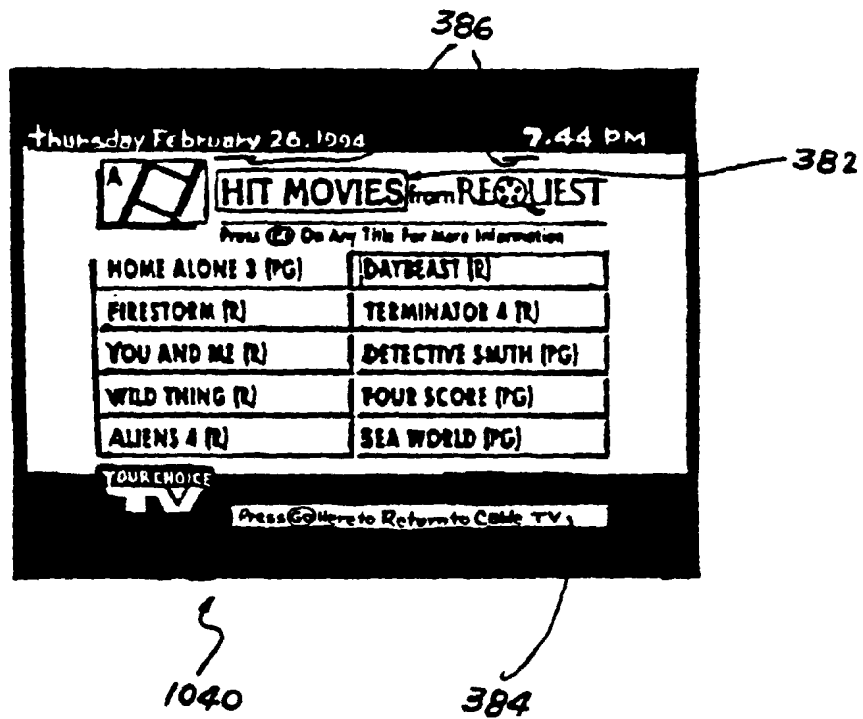
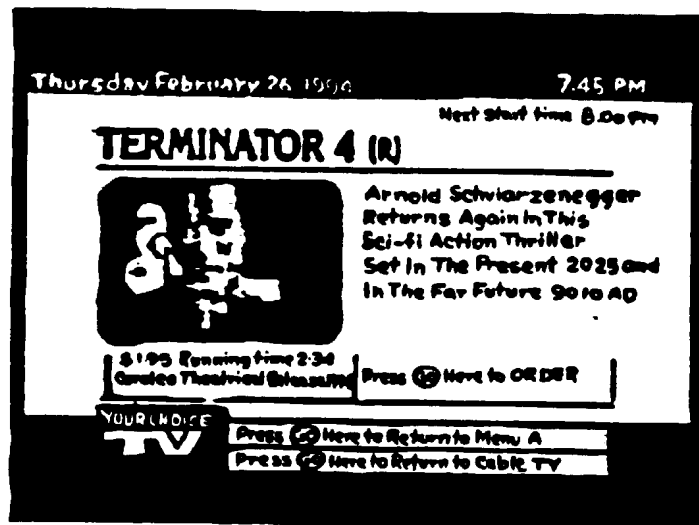


Fig. 20



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Fig. 21